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H. S. CONRAD, *Editor*

VOCATIONAL INTERESTS AND JOB ORIENTATION

A Ten-Year Review

By

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Published for the

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FOREWORD

Educators have long stressed the importance of interests. Psychologists have largely ignored the topic, with the result that the term seldom appears prominently in a psychology textbook. There has been, however, in recent years an increasingly general understanding of the effective role played by interests, so that a compilation of available findings has considerable value for the student.

In 1931, the early literature regarding interests was summarized and criticized by Fryer in The Measurement of Interests. Dr. Carter has now given us a review of what has been published on the subject since that time. In a most readable manner it presents many of the subdivisions of the field within 85 pages. The excellent bibliography provides reference for more detailed study.

The interest inventories now in general use are all considered, with special emphasis, perhaps, on their use for high-school students.

Certain new developments reported for the first time in my own just-published The Vocational Interests of Men and Women are naturally not included in Dr. Carter's report. One such development, for example, regarding the degree of similarity-dissimilarity of interests is of importance to the complete picture.

Within the time limits of his treatment, Dr. Carter has been most adequate. Almost every subdivision of this monograph should stimulate further research. Interests, we know, play a decisive role in adult life. When, how, and why interests arise are questions of moment in the fields of education, guidance, and sociology.

EDWARD K. STRONG, Jr.

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Chapter I

INTRODUCTION

The problems of vocational choice have long been considered piecemeal. In a multitude of unco-ordinated research projects, vocational choice has been studied from the point of view of industry, employment, classification, selection, training, personnel management, mental hygiene, and social planning. It is the purpose of the present report to bring together research contributions from these scattered sources, to knit them together, and to offer a viewpoint for the integration of future research efforts.

Developmental Nature of Vocational Interests

The central problem in vocational choice appears to be one of developmental psychology. In their adjustment to the world of work, young people reveal many aspects of a slow, blundering adaptation to major requirements of the culture in which they live. From the standpoint of education and psychology, it appears that individuals must be shaped and changed and adapted throughout their lives if optimum adjustment is to be attained. It is evident that the greatest service can be rendered to young persons by starting them correctly and by giving them the essential information and advice, selectively, with proper regard for their individuality. This seems to require a firm basis in empirical facts concerning human desires and the manner in which individuals grow and develop with reference to the occupational world.

Scope of the Review

Research on occupational preferences can be interpreted very broadly, as including studies in social psychology, social and cultural anthropology, economics, sociology, political science, education, etc. It appears necessary to limit the present effort to a summary and integration of the contributions dealing with a better-defined or more specific part of this general field. The special emphasis here will therefore be placed upon the problems of development associated with vocational choice and occupational satisfaction.

The earlier studies of vocational interests were summarized by Fryer (77)* in 1931. Psychological thought concerning vocational orientation has developed remarkably since that time. The more recent contributions will be summarized here,¹ with special consideration of those which have

* See p. 73.

¹Since this review was prepared, Strong's book (215) entitled *Vocational Interests of Men and Women* has appeared. In this book, Strong has presented a detailed account of his own research, and hence has reviewed a part of the literature in much greater detail than has been possible here. His review includes a number of the earlier studies. In the present compilation, Strong's publications are considered more briefly, and as a part of a more extensive total field of research.

been made more objective and verifiable through the use of scientific testing procedures. However, in stressing the development of measuring instruments, and in drawing together the essentials of technical and scientific studies, the more empirical, clinical, and practical approaches will not be ignored. These provide the basis for appropriate qualification and realistic direction of the more scientific efforts.

THE NATURE OF THE CONCEPTS

Ideas as to the Nature of Vocational Interests

We may consider first in a general way the nature of the ideas which are central and basic in this field of investigation. Our major concern will be with what the psychologists are really trying to do when they measure or study vocational interests. Here, of course, it is apparent that we have selected one part rather than the whole of the problem of definition of interests. But even within this special area it is apparent that many workers conduct investigations according to somewhat individualistic interpretations of the term "vocational interests."

The most significant thinking concerning the nature of interests is not concerned with verbal distinctions between such terms as interests, attitudes, motives, incentives, aspirations, etc. Most workers are interested in the dynamics of behavior rather than in logical classification.

It was established long ago that interests in general are not necessarily highly correlated with abilities. A study of recent research reports makes clear, however, that there exists a persistent belief that interests may be used to predict future abilities. Also, it is believed that patterns of ability may bear significant relationships to patterns of interests. Cross-sectional studies showing the interrelationships among ability measures and interest scores at any one time are not regarded as adequate.

In studying interests, one is concerned specifically with enjoyment, or satisfaction. It is fairly obvious that ideas as to the seriousness or importance of things will often be associated with ideas as to the interest value of those same things. It is equally obvious that some things may be regarded as interesting but not important, and vice versa.

In studying vocational interests, a majority of psychologists have been concerned with the non-ability correlates of educational and vocational success and satisfaction. This tendency, which actually directs their efforts, has significant implications for method. It means that mere statements as to vocational preferences are regarded as very incomplete and hence inadequate definitions of vocational interests. It implies that the psychologists' definition is somewhat specialized, leading to a discrepancy between the ordinary lay conception and the central idea involved in the work of the scientist. The use of such a guiding central idea has led to an emphasis upon results obtained by standardized instruments, and in general to the use of a common word with a special scientific meaning.

The psychologists have thus come to be concerned with certain stable personality traits, allied with motives. The exact nature of these mechanisms is not usually described in detail. The main concern is with what is measured by the standardized instrument, and what can be done with the results of such measurement. In certain recent papers, a few authors (2, 34, 52, 160) have stated views in which vocational interests were

identified with stable and important personality developments, based upon evaluative attitudes. Such attempts at careful theoretical formulations are helpful. The majority of publications dealing with vocational interests have been in the form of scattered minor studies which have not led to attempts at integration of research efforts. However, these studies are also helpful. For example, an article by Heim (95) offers an analysis of the conditions leading to occupational satisfaction and dissatisfaction. Such investigations are valuable aids to clarification of the concepts and improvement of measuring instruments. At the present time, it is necessary to take account of the practical, clinical, occupational, and less scientific thinking pertaining to the general problem of occupational orientation.

In the absence of directing concepts, in many studies of interests the outcomes have been heavily dependent upon the method of data collection. In studies of the interests of children, a lack of suitable directing concepts has been especially noticeable, but recent workers tend to be more sophisticated. In one of the more interpretative studies, Freeston (74) suggests that interests of children are often dominated by the desire for escape, for freedom from humdrum work, and for adventure. One may note further that interests so conceived are related to intelligence, and the level of aspiration. They reflect differentially assimilated aspects of the culture, according to Carter's theory (34). Young people have been fed upon aspirations, according to the American myth of vertical occupational mobility, and these aspirations receive expression again when the children are asked about their interests. Studies by Sisson (184, 185), Kaufman and Ananev (104) and others emphasize the fact of impractical aspiration, and taken together with other material justify the interpretation given above. Although one can find occasional studies, such as that by Trow (232), which suggest a current of realism in such material, this section of the interest literature dealing with children's stated interests furnishes the main basis for the widespread belief that interests are impractical and autistic.

Recent studies by Symonds (221) have included comparisons of the interests of adolescents and of adults. These studies are based upon careful consideration of the major personal problems of life, and while they are not limited to vocational interests alone they merit consideration here for several reasons. The studies have systematic implications, such as the idea that interests may be related to motives. Furthermore, Symonds showed that while interests are related to problems, they often indicate a surprising independence of desires on the one hand and feelings or judgments as to value on the other. Further, the studies indicate that the interests of adolescents and of adults are similar in many respects, and that it is possible to regard interests as stable and important, although characterized by certain tendencies toward change with age. The importance of study of vocational interests is implied by the finding that both adults and adolescents regard money matters as the most serious problems of life.

This review is largely restricted to those recent studies in which the vocational interests of persons young or old are evaluated in relation to the adult world of work as a frame of reference. Although the concept of vocational adjustment itself needs to be clarified by analysis, as indicated by Lurie (130), it has been a fundamental guiding concept, directing the best efforts in interest measurement. An objective and useful technique, exemplified by the Strong Vocational Interest Blanks, has been developed through study of the likes, dislikes, and indifferences of persons in various occupational groups.

It has been commonly assumed that "vocational interests" are acquired (119); actually, little is known concerning the origins of the traits measured by vocational interest inventories. Carter's study of twin-resemblances (30) suggests that there may be some hereditary influences in the development of interests, although of course such resemblance studies do not conclusively prove an inherited basis. Earlier studies by Kitson (107), and more recent studies by Remmers (167) have indicated means of creating interests, or of altering the degree of interest in a particular activity by means of controlled experiences. Further studies of the effects of specific experiences upon the vocational interests of young people are much needed.

It is known that interests as measured by the inventory method have surprising stability. This topic will be discussed more fully later. The writings of Strong (213) indicate that successful men in a given occupation-group have a characteristic pattern of likes and dislikes different from that of men in other groups. There is little scientific evidence to indicate why these patterns of interests should have such remarkable stability, or under what conditions the interest patterns are changeable. The assumption that minor environmental influences easily alter vocational interests has been current for twenty years; the evidence of stability is more recent. It is also frequently assumed, implicitly rather than explicitly, that if interests are acquired they will not be stable. However, it is common knowledge that acquired modes of behavior, such as habits, are often surprisingly fixed. One may also add that habits are not entirely accidental in origin. A general view of the studies of the past ten years does not support the idea that experience in a given occupation is necessary to the development of the patterns of interest characteristic of that occupation. All these odds and ends of evidence lead one to desire a comprehensive theory which is in accord with the facts.

Recent studies (29, 33, 34, 222, 223) at the Institute of Child Welfare of the University of California have indicated that vocational interests are patterned, in the common meaning of the word. These studies have shown that profiles of interest scores are stable, that they differ for different persons, and that a consistent account may be given of the manner in which they change with age. Hoppock (100) has pointed out some shortcomings of the use of profiles as indicating more than the tests upon which they are based, but his arguments center about ques-

tions of reliability and validity, and in these two respects the best interest scales are more adequate than ordinarily supposed. Beyond this type of profile study, one might wish for more evidence as to the dynamic bases for development of the personality factors manifested in "vocational interests." It seems unlikely that such insight as we desire will come very quickly. It will probably require many years to gather the necessary descriptive facts about vocational interests, and to relate these to the deeper layers of personality.

Correlates of Vocational Interests

A number of studies, such as those by Lentz and Nickel (122) and by Carter (34) contain explicit suggestions that interests are properly regarded as traits of personality. The series of studies from the University of California, cited above, indicates that interests are not independent of intelligence, although they are primarily affective phenomena. The tendency to develop interests in a given occupation is related to the IQ (30). The stage of development of interests reached by young people in a given grade in school is related to intelligence. Thus Carter and Jones (33) have found that in a tenth-grade group those who stated a choice of occupation were younger, brighter, and more mature in interests than those who had made no choice of occupation.

The lack of close relationship between interests and abilities is clearly seen, but its significance has not been fully appreciated. A great mass of evidence in the older literature has been summarized by Fryer (77). The persistent view that interests need not be measured directly but should rightfully be inferred through studies of abilities continues to find expression in popular articles (173). This view ignores the data provided by various workers showing that interest tests used for various purposes make an independent contribution to the prediction afforded by available ability tests. It may also be noted that aptitude testing, useful though it may be, has not been so outstandingly successful as to make further study by other techniques unnecessary.

As Strong (197, 199) has shown, interests tend to change with age, according to a definite pattern. The interests of fifteen-year-old boys are, on the average, different from those of college seniors and older men. However, studies such as that by Carter (30) have shown that the correlations of inventoried interests with age are remarkably small within the junior and senior high-school age groups. Many such apparent contradictions indicate that a number of variables including age, specific experiences, social and economic group differences, and occupational experiences must be studied more intensively if we are to understand the influence of each upon the development of vocational interests.

Why Study Interests?

As Strong (208) has pointed out, study of aptitudes has not solved the problems of vocational and educational guidance. Fortunately, there is

good reason to be hopeful about the potentialities of attitude measurement in the field of guidance. We tend to take for granted that morale, interest, and purpose are important variables; these are generally intangibles in the educative process in school and in society at the present time. A research viewpoint is forced upon us by the fact that only by knowing more about them can we make these factors become tangible goals to be approached by systematic and efficient programs of action.

Chapter III

THE VARIETIES OF MEASURING INSTRUMENTS

Lists and descriptions of many inventories for measurement of vocational interests are available elsewhere (26, 27). Our present purpose is not to duplicate such descriptions but rather to consider the main concepts embodied in the instruments, the ideas which are the determiners of content, the devices which are used in order to secure pertinent responses, and a few examples of outstanding inventories. The emphasis here will not be upon the details of particular tests but rather upon the general characteristics of attainment in this field of testing.

The interest inventories used in recent studies have been heterogeneous in form, content, technique, and length. They range from some which may be regarded as formal scientific instruments to others which are mere check lists. The former include a few inventories prepared and standardized as tests are, and embodying systematic and explicit evidence of a sound theoretical basis. Evidence of the validity of interest tests is very complicated and will be considered more fully later. Evidence of reliability is more easily obtained, and the more widely used tests such as Kuder's, Strong's, and several others have been found adequately reliable. Few interest inventories are accompanied by manuals containing an extensive bibliography indicative of evaluation through repeated application by various investigators. These considerations suggest why only a few inventories need be selected for detailed discussion.

Central ideas, hunches, or hypotheses, based upon previous research in psychology, are exploited by various authors and carried to expression in the construction of the measuring instruments. These ideas seem to determine the content of the inventories, the method for securing responses, and the scoring devices. They do not fully determine the outcomes of application of the tests, where the picture is complicated by questions of efficiency, especially questions concerned with the statistical requirements for measurement.

The idea that successful workers in a given occupation have a characteristic set of likes and dislikes, different from that of workers in other occupations, is associated with the use of the Strong Vocational Interest Blanks (213, 214). This idea is a determining factor in the scoring procedure and in the technique of using the test results in guidance. The Strong blank for men has long been the outstanding device of its kind; the women's blank is newer, but it has been constructed along similar lines. Evidence of the value of the women's blank is beginning to appear in the literature (222).

Is it possible to explain why the Strong Vocational Interest Blank is superior to some others? There appear to be many reasons, all to be found in historical developments in interest measurement. The earlier phase of interest measurement, summarized by Fryer (77), furnished evidence as to the nature of items useful in this form of testing, and the number of items needed for reliable measurement. These and many other lessons from experience have been incorporated into the Strong tests.

There are four hundred items in the Strong Vocational Interest Blank for Men, and 410 in the women's form. The specific items include names of occupations, amusements, school subjects, activities, peculiarities of people, order of preference among activities, types of persons admired, choice between two paired activities, and self-ratings of present abilities and characteristics. The items are to be marked according to one's likes, indifferences, dislikes, choices, and preferences. Scoring schemes have been developed through study of the responses of persons engaged in various occupations. Several sets of norms are available, for comparison of the individual with different occupational groups and with groups of college students and adults. Group scoring schemes are also available, based upon consideration of related groups of occupations; these appear especially useful to counselors and others engaged in the preliminary diagnosis of vocational interests of young persons. The main limitation to extensive popular use of these tests is the fact that the scoring is laborious and necessarily expensive. The test is reliable and valid (the details will be discussed in the section on reliability and validity) and is accompanied by a manual which provides an extensive bibliography, and much pertinent information about the test, its construction, scoring, and general usefulness.

The Kuder Preference Record (111) is built around the idea that one can measure preferences for types of activity, and that these preferences have vocational significance. Hence in using this inventory one does not measure the interests of specific occupational groups; instead one measures the preferences that are presumed to be characteristic of general types of work, and each preference score indicates a preference for a particular group or class of occupations. Nine types of activity are involved, namely: mechanical, computational, scientific, persuasive, artistic, literary, musical, social service, and clerical. The basic assumption is that one can predict how an individual is likely to react to educational and vocational situations on the basis of his reactions to familiar activities. Accompanying the test are indications of the occupations suggested in line with the nine dimensions of interests. From the standpoint of classification or guidance this approach seems sound, and appears to supplement that indicated by the treatment of the Strong blanks. There is evidence in the published literature (231, 260) that the Kuder Preference Record is highly reliable. There is insufficient evidence of the validity and accuracy of the occupational classification indicated in the manual.

The Allport-Vernon Study of Values (2) summarizes responses according to Spranger's type theory, which emphasizes evaluative attitudes. Studies by different workers (2, 59, 160) indicate that this test may be used for several of the purposes for which the vocational interest inventories were devised. The scores provide discrimination between curricular groups, and are correlated to some extent with scores on various scales of the Strong Vocational Interest Blank. The various "types" into which persons are classified are: theoretical, economic,

aesthetic, social, political, and religious. Such type classification is possibly an effective technique for studying interests. It consists of using an additional frame of reference for the study of educational and vocational groupings. The central idea in the vocational use of this test seems to be that type of personality is the important factor in vocational adjustment; this thought is certainly not completely independent of those ideas at the basis of construction of interest inventories. While the concepts involved in this approach are valuable, the test itself is inadequate; the language and technique limit its range of usefulness largely to highly educated and intelligent subjects, and it is not sufficiently reliable for use in individual diagnosis.

The fact that interests influence educational choices has long been in evidence, and a whole group of inventories have been constructed with this in mind. Early studies by Jacobsen (102), Van Tuyl and Eurich (240), and others had indicated that interest items could be used to predict choice among curricula, as well as level of scholarship. Following this development of the inventory, there have appeared a number of studies, some based upon new tests and others based upon special scoring of already existing collections of items. The Young-Estabrooks Scale for Measuring Studiousness (258) is a scoring system for use with the Strong Vocational Interest Blank. Duffy and Crissy (59) have shown that the Allport-Vernon Study of Values can be used for the prediction of scholarship. The Dunlap Academic Preference Blank (65) has been constructed especially for this purpose; the evidence from seventh- and eighth-grade children seems to indicate that it is highly reliable. Garretson (80) has shown that his preference questionnaire will discriminate effectively between groups of students in technical, commercial, and academic studies. Garrison (82) has constructed an interest inventory which discriminates between students engaged in the study of engineering, and those in agriculture, or in business. Such uses of the interest inventory are not new; they were foreshadowed by the work of Jacobsen, Remmers, and others (see reference 77 in the bibliography). The modern work has brought improvements, and an increase in the variety of specific uses to which the instruments can be put.

The technique of inferring interests through measurement of abilities of a specific sort has not received much attention in the past ten years. At one time this idea seemed promising as a basis for interest test construction. It may be remembered that no technique of this sort has been found very satisfactory in the past, and that the workers who study interests have often sought to develop measuring devices independent of measures of ability.

A number of tests seem to be built around the idea that interests represent details of affective response, dependent upon experience, and worth studying from a developmental standpoint. Such inventories for study of the interests of children and of high-school groups typically include sections in which the subjects indicate preferences among things to own, things to do, activities, games, occupations, school subjects,

sports, personal characteristics, reading matter, etc. These "child-centered" inventories contain much the same sort of items as the standardized inventories, but have not been provided with scoring schemes oriented to occupational choice. Their usefulness is often limited by the lack of provision of standardized techniques for scoring in the light of specific criteria.

In using the Van Allyn Key to Vocational Guidance (237) one judges dominant interests on the basis of abilities, school records, extracurricular activities, and interviews. Then one considers the occupational possibilities implied. A functional classification of occupations is attempted; this idea is a very prevalent one in interest measurement today. Self-rating techniques are involved in both the Van Allyn Basic Interest Questionnaire (238), and the occupational orientation inquiry as used by Wallar (244).

Remmers (165) and Silance (183) have explored some uses of the attitude-scale technique in the study of vocational interests. By means of a generalized attitude scale, attitudes toward various occupations are studied one by one, and then the data are analyzed in the search for patterns of reaction. Remmers has shown that attitudes toward certain different occupations tend to be associated—for example the ministry and high-school teaching. In this use of the generalized attitude scale, as in other uses of questionnaire techniques, there is implicit acceptance of the principle that occupational interests are not entirely dependent upon experiences with the activities involved in the jobs.

The Structure of Interest Tests

The organization of interest inventories and the methods of obtaining responses are somewhat stereotyped; such stereotypy could result from a thoughtless perpetuation of familiar procedures, but does in fact have some theoretical basis. One of the central ideas involved in the procedure is that persons lacking information about jobs can furnish responses indicative of their vocational preferences by responding to suitably selected familiar details. The details of response may have significance for occupational interest, and may be used in diagnosis, although the person tested may not know their implications. Another basic idea is that young persons who cannot make valid generalizations such as are required in vocational choice can nevertheless provide valid responses to items which are of limited scope. The halo effect and other troublesome errors are thus minimized, and the standard scoring technique provides the organization which fuses the likes and dislikes into a total score carrying vocational significance. There is undoubtedly some truth in these ideas, and they have had great influence upon the organization and content of interest inventories now in use.

One of the commonest procedures used in the various inventories is that of checking brief items to indicate likes, indifferences, or dislikes. This is an old technique (see reference 77 in the bibliography), and one

that has been much used. Another device is checking to indicate preference between two opposed items; this device is used in the Allport-Vernon Study of Values, and in parts of many inventories. In the Kuder Preference Record it takes a modified form wherein one indicates the best-liked and least-liked among three alternatives. In one section of the Allport-Vernon Study of Values, four statements are to be arranged in order to indicate preference. In both the Allport-Vernon test and the Kuder test the emphasis upon choices is such as to control the average level of the resulting interest profiles, thus eliminating from consideration one possibly useful dimension of interests. The Strong Vocational Interest Blanks employ a variety of the devices for securing responses, including those listed above, and also techniques for judging or rating one's own present attitudes and characteristics. It seems probable that this inclusion of a variety of devices is desirable.

Comparative Studies

Recently, a number of comparative studies of various interest inventories have been made; some of these investigations have implications for test construction. The study by Duffy and Crissy (59) indicates significant though low correlations between the scores for some of the occupational interest patterns and the scores for certain values as measured by the Allport-Vernon test (2). Such comparative studies are perhaps preliminary to better definition and measurement. They indicate that various devices may possibly be used to measure the same thing in the field of interests, and they suggest the desirability of more research into the manifold problem of efficiency in interest measurement. A number of studies (20, 86, 112, 150, 155) have been published in which the Strong tests have been compared with other similar tests used for the same general purposes. Such studies usually indicate that there is some agreement among the various measures, but that the independence of such measures is more impressive than their agreement, and that the Strong blanks are in many ways superior to the others with which they have been compared.

In attempts to show the value or lack of value of vocational interest tests, several techniques of appraisal have been employed. Crosby and Winsor (48), and Gordon and Herkness (86) have used the technique of appraisal by pupils' judgment, while Peters (155), Berman et al. (20), and Parry (150) have used comparative methods based upon the application of several blanks to the same groups of pupils. While these methods are somewhat useful, they have not resulted in complete evaluation of the inventories. A third procedure is that indicated in the compilations of Buros (26, 27) in which expert opinion has been consulted. None of these methods is perfect. Some writers (150) convey the impression that disagreement in the apparent indications from several inventories is evidence that none of them is any good. A fourth procedure for evaluation is undoubtedly the soundest, namely the evaluation of the inventory

through the results obtained by its use over a period of time. It becomes evident that only those inventories for which evidence can be found in a more or less extensive bibliography of published studies may be precisely judged. There is no quick method of reliably evaluating interest tests, and for the majority of such tests available in 1944 the basis for an evaluation is inadequate.

THE RELIABILITY AND CONSTANCY OF INTERESTS

There have been relatively few studies of the reliability and permanence of vocational interests as measured by the standardized inventory method. Misconceptions are prevalent, largely because of the multitude of studies conducted in the earlier and less scientific period of interest measurement. The concepts, the procedures in measurement, and the methods of handling the data have changed remarkably since 1925. Given the use of a modern interest inventory, the problem of ascertaining the reliability of the measurements has three main aspects; namely, the reliability of item-responses; the reliability of total scores from various scales; and the permanence or constancy of such scores as one may wish to employ.

The Stability of Item-Responses

It is difficult to find any major significance in the many studies of constancy of responses to items of interest inventories. Most of the studies have not been so designed as to separate clearly the effects of response-error and the gradual and cumulative changes due to development of the individuals tested. Although evidence of the stability of item-responses, when accompanied by a statement of the nature and number of items, implies something about reliability of the tests used, direct study of the reliability of total scores seems much more informative. Study of item-constancy seems appropriate as a preliminary step in the improvement of tests, but item-constancy data have not been much used in test building or in test revision.

Brief consideration of some facts about item-constancy will lead to a few generalizations or guiding principles. Cleeton (40) reported that retests with one month intervening resulted in reversal of responses to only 6 per cent of the items of his interest inventory, which calls for marking of items as either liked or disliked. Dreese and Mooney (58) report that the constancy of item-responses for their inventory varied from 83 per cent to 86 per cent for grades four, five, and six. In this inventory, responses consist in circling L, I, D, or U, to indicate liking, indifference, disliking, or lack of knowledge of the item in question. For his Academic Preference Blank, Dunlap (64) reported constancy of responses by showing the percentage of identical responses; these percentages varied from 19 to 92, with a mean of 54.3, when the retesting of 146 seventh-grade pupils was done after an interval of ten months. He found, further, that the constancy of item-responses as measured by identical markings varied for different individuals from 16 per cent to 72 per cent, with a mean of 55 per cent. Gentry (83) has reported the reliability of his vocational inventory by giving percentages of change in results for 412 students who took the test in the ninth and in the twelfth grade. These percentages vary from category to category. The responses

were classified as 70 per cent identical, 20 per cent similar, and 10 per cent different, for typical inventory items. For the part dealing with vocational choices, the percentages were 53 same, 28 similar, and 19 different. Thus it appears that interests as indicated by typical inventory items are more stable than those as indicated by self-reports of vocational choice.

It is evident from these findings that the constancy of item-responses for vocational interest inventories is considerable, and that it lends support to a belief in the reliability of such measurements. But the reported facts vary with the time interval, with the number of categories of response, with the type of item, with the individual person tested, and with the age- and grade-level under consideration. In selected, superior studies, such as those cited above, the use of the comparative method lends some significance to the facts of item-response constancy. As ordinarily used, the procedure of reporting the constancy of item-responses seems to be mainly a hangover from the earlier days when such procedures were prevalent and when suitable scoring scales were not available for summing up the responses in relation to some definite criterion.

Reliability of Total Scores

A number of factors contribute to the difficulty of obtaining complete evidence of the reliability of interest tests. There are relatively few inventories which provide suitable total scores for study. Alternative forms of interest tests are conspicuously lacking. The scoring schemes in use with the best tests are laborious and expensive to apply, especially in view of the multiple scoring procedures. The doubly laborious and costly task of ascertaining odd-even reliability coefficients has no doubt delayed research on the reliability of interest tests.

Recent studies indicate that scores obtained from various interest inventories are often surprisingly reliable, in view of the subjective nature of the responses called for. Traxler and McCall (231), using the test-retest method with the Kuder Preference Record (old form) applied to ninety high-school students, found reliability coefficients ranging from .81 to .91, with a mean value of .86 for the seven scales. In the same study, data from fifty-two college students yielded reliability coefficients ranging from .59 to .87, with a mean value of .77. In the present writer's judgment, the Kuder Preference Record is better suited for use with high-school than with University students. For his vocational interest inventory of 670 items, Cleeton (40) has reported reliability coefficients varying from .82 to .91, obtained by the odd-even method. Dunlap (65) has furnished reliability coefficients varying from .80 to .90 for his Academic Preference Blank. Estes and Horn (69) who constructed several interest scales for engineers, using the Strong blank, reported split-half reliability coefficients with the average value of .88 for such scales. The reliability coefficients reported for their interest question-

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naire by Garretson and Symonds (80) are .86 for academic, .925 for commercial, and .953 for technical interests. Using two different arrangements of the items, Greene and Dahlem (88) obtained reliability coefficients of .76 and .89 for scores on the Michigan Vocational Preference List; it appeared that grouping of the items by occupational divisions increased the reliability, but this may have been due to spurious factors such as correlation of errors or halo effect. A reliability coefficient of only .66 was found by Young and Estabrooks (258) for their scale for measuring studiousness; this leaves much to be desired, but it must be remembered that the authors attacked the difficult problem of measurement of studiousness apart from intelligence.

Much work has been done to ascertain the reliability of the scores obtained by means of the Strong Vocational Interest Blanks. Strong (213) has reported reliability coefficients for his women's blank varying from .74 to .94 for the several scales. Elsewhere Strong (214) has indicated a mean reliability coefficient (odd-even) of .88 for the various scales of his interest blank for men. It appears that most of the interest scales for the Strong blanks have average reliabilities equal to those of group tests of intelligence. Either odd-even reliability coefficients, or test-retest coefficients obtained at short intervals satisfy the above statement. Such results have been obtained by Strong (203) in a study of Stanford seniors and graduates, and by Burnham (25) in a study of Yale undergraduates. Similar results were found by Van Dusen (239) studying college undergraduates. Canning, Taylor, and Carter (29) have shown that retest coefficients are almost but not quite as high among high-school pupils as among college groups. Taylor's study (223) provided reliability coefficients obtained by the odd-even technique, for ten scales of the Strong blank administered to 64 eleventh-grade boys. These correlation coefficients ranged from .75 to .95 and had a mean value of .87. In the same study, results of application of the Strong women's blank to a sampling of eleventh-grade girls yielded values just slightly higher than those for boys.

This proof of reliability of measurement furnishes some justification of the studies of patterns or profiles of interest-test scores. In one such study, Carter and Jones (33) have shown the existence of several clearly distinguishable patterns of interests prevalent among high-school pupils. The further studies by Carter (34), Taylor (222, 223), and Canning (29) have served to show that patterns of interests as revealed by profiles are surprisingly stable, and related in a significant way to the available facts from case studies. In view of the demonstrated reliability of the scores from separate scales, the profile material may be taken as highly significant.

Permanence of Vocational Interests

The problem of permanence of vocational interests, or constancy of interests, is more complex than may appear at first sight. In some of

the studies the emphasis is placed upon unpredictable or random changes in interests which presumably take place over a period of time; in other studies the emphasis is upon consistent trends in the development or decline of interests.

Perhaps the most comprehensive report on this problem is that by Strong (197). In this study, the Strong inventory was administered to 2,340 men whose ages varied from twenty to fifty-nine years. The results indicated that older men do not necessarily have more interests than younger men, but that the pattern of responses changes with age. The frequencies of responses to items show, on the average, changes of about fifteen per cent between ages twenty-five and fifty-five. These changes of frequencies are sometimes increases and sometimes decreases; sometimes the relationship with age is curvilinear, suggesting waxing and waning of interests. Apparently the greatest changes take place between the ages of fifteen and twenty-five years; the changes after that are smaller and occur more slowly and cumulatively. Little or no change occurs after age fifty-five. The changes from decade to decade in general appear to be gradual, and slight in relation to the magnitude of individual differences. Older men more often dislike items suggestive of physical skill and daring, or change of established modes of behavior. There are systematic changes in categories of interests, suggesting that older men have less liking for items in the section of the Strong blank presenting a list of occupations, less interest in languages, and more liking for reading, for solitary pursuits, and for persons with conventionally desirable traits. Responses to working conditions are highly individual and apparently not generally explainable in terms of age.

The directional or systematic change of interests with age has been regarded as worthy of special study, and Strong (199) has approached it in another way by providing a scale for the measurement of maturity of interests. The reliability of this scale is approximately .95, but the scale has been criticized (20) for lack of complete separation of age differences from occupational-group differences.

Most of the studies of stability or permanence of interests are concerned primarily with the prediction of later status from earlier measurements. In these studies, the isolation and examination of consistent trends has not been emphasized, hence the studies may be differentiated from those in which special concepts such as interest maturity have emerged. It is only natural, however, that these studies have employed the small number of better-standardized inventories much more often than the other available tests. Many of these investigations have used the Strong Vocational Interest Blank for Men. In Burnham's study (25) this test was administered to college undergraduates, with a one-week interval to ascertain reliability, and with a three-year interval to ascertain stability over longer periods. It was found that the interest scores were more stable than college grades, but less stable than scores on intelligence tests.

Strong has conducted a series of investigations of the stability of in-

ventoried interests. In an early study Strong and MacKenzie (196) showed that the interest scores and item-responses of ministers and of accountants were remarkably stable; the retest interval in this investigation was eighteen months. Strong's study of change of interests with age (197) indicated that the changes observable from decade to decade are relatively slight, and increasingly so as age increases. His study (203) of permanence of vocational interests showed an average correlation of .84 between the scores obtained by Stanford men as seniors and the scores they obtained five years later. Rank orders of scores for individuals remained strikingly similar. The main observable change seen in a five-year interval was a slight increase in the magnitude of scores, indicative of development in the direction of the interests of successful men such as constituted the criterion groups. In another study (205) Strong reported that the stability of interests of persons fifteen to thirty years of age is indicated by correlations which varied from .64 to .91 when the time intervals varied from one to five years and the different occupational scales were considered.

In a recent study, Van Dusen (239) reported upon the permanence of interests of male college students tested by means of the Strong blank. A tendency was found for high scores on initial tests to decrease during the college years. Evidence was also presented to support the belief that the interests of some persons are much more stable than those of others, that interest scores change less when vocational choices remain constant, and that inventory scores on scales related to vocational choices remain more constant than scores on other scales. In general, Van Dusen's study agreed with Strong's in showing the same general order of magnitude of retest correlation coefficients.

An extension of this series of studies to cover the high-school age groups was undertaken by Canning, Taylor, and Carter (29). The results showed that constancy of interest scores obtained from the Strong blank is only slightly less for high-school samplings than for college and adult samplings. The results for different scales in the Strong blank varied. Retest coefficients obtained by testing in the tenth grade and again two years later ranged from .48 (office worker scale) to .66 (life insurance scale), and had a mean value of .57 for the seven scales employed. In Taylor's study (223) retest coefficients were slightly higher when based upon tests given in the eleventh grade and again three years later. The mean correlation was .71 for the nine scales used. Strong's study (203) of college men yielded retest coefficients varying from .59 (C.P.A. scale) to .84 (Chemist scale) with a mean value of .73 for the same seven scales used by Carter, Taylor, and Canning. The correlation between the rank-orders for permanence coefficients found in these two studies was .71. For the high-school group, the least stable scores were those based on the interest scales having the highest correlations with interest maturity (e.g., Teacher, Office Worker). The more reliable scales (e.g., Physicist, Doctor), and the scales dealing with interests less related to maturity (e.g., Chemist, Life Insurance Salesman), yielded the higher permanence

coefficients. Contrary to the expectations current in the literature, there was no marked tendency of scores of high-school boys to increase in magnitude from the tenth to the twelfth grade. The development with age is often likely to be concerned with the organization of interests, and choice among several interests, rather than general increase in scores.

Carter and Jones (33) showed that the profiles of interest scores obtained when high-school boys were tested by the Strong blank revealed the existence of definite patterns of interest, related significantly to their vocational choices and their IQ's, and personality traits as judged by observers. The profiles seemed classifiable with few exceptions into four or five groups. A profile frequently found was that in which scores were high on the Chemist and C.P.A. scales, and low on all the others. A second fairly frequent one was that in which scores were high on the Teacher, Secretary, and Office Worker scales, but low on most of the others. In a third type of profile, scores were high on the Lawyer, Life Insurance, and C.P.A. scales, and low on the others. A fourth common profile showed high scores on the Chemist and Teacher scales. Carter's later study (34) showed that these profiles remained very similar from year to year, suggesting stability in the organization of interests. The factors probably affecting the development of interests were discussed at some length in the paper. This discussion centered around an interpretation of vocational interests as somewhat individualized responses to cultural forces.

Taylor and Carter (222) provided evidence of the stability of interests of high-school girls, as measured by the Strong Vocational Interest Blank for Women. Profiles of interest scores were presented, based upon tests conducted in the eleventh grade and again in the twelfth. The similarity of profiles obtained from such retests was very great. The discussion of relationships between the interest scores and other evidence collected from case histories indicated that the interest-test results are significantly related to other variables such as age, intelligence, social success and vocational intentions. Although these relationships are not so simple as to be readily expressed in quantitative form, the integrated and meaningful character of the data on particular pupils is noteworthy.

Constancy of Vocational Choices

The stability of vocational interests is also indicated indirectly by another type of study, which deals primarily with specific vocational choices. This topic will be discussed more fully in another section of this review; only a few of the recent reports having special relevance to the present discussion will be considered here. The study by Dyer (67) suggests greater stability of interests on the part of those who decide early upon choice of vocation. This sort of finding may have several explanations. One is that, other things being equal, habit systems which have priority over other habit systems are more stable. Another explanation is that brighter persons tend to make choices earlier

and tend also to have better-integrated personalities. A third possible explanation is that persons who make choices earlier than the average are less likely to base those choices upon current fads, fashions, or conventions, which result in choices without satisfactory individual basis.

Lehman and Witty (118) found little evidence of permanent interests in most of the vocational preferences reported by children from ages eight to eighteen. This study is representative of a group concerned with permanence of interests as shown by stated preferences and by items of tests. Such data pertain to a different conception of the term "vocational interest," and indicate little with respect to stability of interests as measured by total scores upon standardized vocational interest scales. There is reason to believe that the modern standardized interest inventory yields more dependable results.

THE VALIDITY AND GENERAL USEFULNESS OF AVAILABLE
MEASURES OF VOCATIONAL INTERESTS

Recently published studies of the significance and value of interest tests may be roughly classified into five groups. The first is concerned with the meaning of interrelationships among measures such as vocational choices, interest scores, chance effects, etc. The next four classes include the more scientific or critical studies of the uses of interest measures in the prediction of vocational choices, vocational success, academic choices, and academic success. These are the main purposes for which the inventories have been used. In all this work on validity, a main obstacle to progress is the lack of any adequate criterion. Even the most extensive and laboriously painstaking studies do not provide efficient measures of the satisfaction or success which the inventories are intended to predict.

The correlations between self-estimated interests and interest-test scores are not very high. Bedell (17) studied the interests of college women in certain vocations as indicated by self-estimates, and as indicated by the Strong blank. Significant positive correlations were found; however, most of the correlations were below .50. Using the Kuder Preference Record, Crosby and Winsor (48) obtained correlations having a central tendency of .54 between interests as measured and as estimated. The correlation values were very similar in magnitude for the seven different areas sampled. Bedell found that the differences between estimated and measured interests were smaller in the field of choice, and smaller for some students than for others. A correlation of .42 was found between intelligence test scores and capacity to estimate one's interests.

Additional evidence of relationships among these variables is furnished by Carter and Jones (33) and by Carter, Taylor, and Canning (35). Their data indicate clearly that interest scores from the Strong blanks are higher in fields related to vocational choices than in other groups of occupations. Further, the more intelligent students in the tenth grade had made their vocational choices more often than the less intelligent students. Still more data are provided by Congdon (42), who used Cleeton's inventory. She found that for occupations in a given group, higher mean scores were obtained by students whose claimed interests were in that group than by students whose claimed interests were in other fields. Congdon also found that large percentages of students made their highest scores in the groupings in which their chosen vocations appeared.

In a study by Burnham and Crawford (24), answers to ten Strong Vocational Interest Blanks were determined by tossing dice. In nine of the ten, fairly high scores on the Boy Scout Masters scale were obtained; and in all ten fairly high scores on the Journalist scale were obtained. High scores on other scales were not found. The evidence could possibly, but need not necessarily, be interpreted as indicating lack of validity of the Scout Masters and Journalist scales. A possible alternative expla-

nation would be that the interests of persons in those two groups are very broad, common to people in general, and very likely to occur by "chance." A lack of specific patterning of interests for those two groups could explain the high scores obtained by the dice, without the assumption of lack of validity of the scales.

Steinmetz (189) studied the effect of attempting to secure different scores, on the scores actually obtained by students when retested with the Strong blank. The results indicated that students are able to secure high scores on occupational scales chosen at random, that they can improve their scores markedly by trying to do so, and that such improvement (as one might expect) is greatest when initial scores are low. The effects, of course, spread to scales other than the ones deliberately aimed at. Such findings suggest that the main use of the inventory must be with students who are able and willing to co-operate with the examiner in discovering their interests and in planning their vocational choices.

Cutler (49) conducted a study of the validity of one section of the Cleeton inventory, The SR section, finding low correlations with the total and social-adjustment scores of the Bell Adjustment Inventory, and low correlations with the social and political sections of the Allport-Vernon Study of Values. One hundred college freshmen served as subjects in the investigation. Since the SR section of the inventory is intended to measure social adjustment, the data shed some doubt upon the validity of this part of the inventory.

In a number of studies (42, 44, 51, 54, 60, 61, 251) persons engaged in counseling have expressed opinions as to the value of interest tests in guidance. Most of these opinions are favorable, although Cowdery (44) assigns a minor role to interest tests as supplementary to indications of ability, and Dulsky (60, 61) regards such tests as useful only as clues for interviews. Williamson (251) and Darley (51) appear to regard the Strong blank as valuable in counseling work, the latter having worked out an effective clinical approach for the use of this instrument in guidance. Congdon (42) concluded that measured interests are as valuable as intelligence scores for predicting success in student teaching, for women; sufficient data were lacking to permit conclusions concerning the men. Congdon used the Cleeton inventory, and found it valuable in counseling students, especially those having difficulties in meeting the requirements of their chosen vocations, those seeking one kind of job while better fitted for another, those having no definite vocational goal, and problem students.

Sisson's data (186) suggested that vocational interests as indicated by statements of occupational choice among college students are of little practical value. He found that only 38 per cent of graduates of Wesleyan University entered the occupations for which they had stated preference at college entrance. The study covered a three-year period. About 40 per cent changed their preferences while in college; about 53 per cent entered the occupations they chose as seniors. Over 80 per cent of the

choices which remained stable were for professions, including only medicine, the ministry, teaching, and law. It is suggested that students should postpone specialization until information about vocations and much insight into their own abilities are available. In criticism, it may be stated that some students, often those who make an early choice, may actually profit from an early decision. The present writer would urge a more careful clinical consideration of cases before making recommendations as to the desirable age for specialization.

In a study of 2,424 Stanford alumni, Wrenn (256) found evidence of widespread vocational dissatisfaction. Nearly a fifth of this group of Stanford graduates reported that they would not select the same vocations if they had the choice to make over again. Such dissatisfaction was widespread, covering all but twenty among ninety-one occupational fields sampled. The dissatisfaction was found among professional workers as well as among business groups. These findings suggest that more accurate determination of fundamental interests among college students would be desirable. They also suggest the lack of validity, in many instances, of vocational choices as indications of vocational interests, even when the choices consist of actual entrance into an occupation or a program of training. A further finding was that vocational satisfaction is more closely related to the consistency of statements of vocational choice made in college than to the occupation itself. This study serves to indicate some of the difficulties in the way of measurement of vocational interests.

The Prediction of Vocational Choice

If interest inventories are valid, according to one very reasonable conception of validity they should enable the prediction of vocational choice. However, some limitations to such prediction must be recognized. It is not clear just what criterion should be used, whether it should be the occupation the individual desires to enter, or the one he actually does enter. Often one has to be content with the individual's statement of choice, a thing of unknown significance especially when given carelessly by young persons.

When the scattered bits of evidence are put together, the picture seems to be one of moderate agreement among various indications, no one of which is adequate. These indications include interest-test scores, scores on other personality tests, statements of vocational choice, and evidences of entrance into programs of preparation, and actual entrance into occupations. Even the latter two are imperfect indications of vocational preference. Studies such as those by Stuit (216) and by Wrenn (256) indicate that persons often enter programs of training for reasons other than preference, and that many persons are greatly dissatisfied with the occupations in which they find themselves.

The real purpose of the vocational-interest inventory is to predict vocational satisfaction and to indicate vocational preference. There is

clear-cut evidence in a variety of studies to show that claimed vocational choices are related to interest-test scores. Congdon (42), using the Cleeton inventory, found that students whose claimed interests were in a given occupational grouping secured reliably higher mean scores for that grouping than did students whose claimed interests were in other fields. Similarly, Carter and Jones (33), and Carter, Taylor, and Canning (35) showed that high scores on the various scales of the Strong Vocational Interest Blank were closely associated with claimed vocational interests among high-school students. There can be no doubt that students often take training for the occupations they claim to prefer, and that they often enter into the occupations for which they have had training.

One of the most clear-cut studies of the significance of the vocational inventory for prediction of vocational choice is that by Strong (210), who conducted a follow-up study of Stanford graduates. He found that almost fifty per cent of the seniors changed occupation within five years after graduation, yet marked agreements were found between occupational choices in college and interest scores obtained then and again five years later. For each individual who changed his occupation, the interest score for the second occupation was usually the highest or second-highest score obtained in the senior year in college. Those who did not change occupation showed for their chosen occupations higher mean scores on the interest test than for any other vocations; they also had higher mean scores for their chosen occupations than did men entering other occupations; and, finally, they had higher mean scores for the chosen occupation than did men who changed from it to other occupations.

The significance of the Strong Vocational Interest Blank for Men, in relation to vocational groupings, was the subject of an investigation by Darley (50), who was able to show marked personality differences between groups of students whose highest interest scores were in different vocational fields. The occupational groupings were classified as suggested by Strong's analysis of interests of occupational groups; the resulting classes were those having interests in business detail, technical, verbal, business contact, and social-service jobs. People with major interests in the different classes of occupations differed in morale, in emotional stability, in self-confidence, in social skills, and in attitudes such as economic and political conservatism. The implication that such differences are important determiners of vocational choice and vocational satisfaction is fairly clear. It is of course also possible that the attitude differences were developed as a result of experiences following or dependent upon vocational choice.

A study of 297 girls in high schools led Skodak and Crissey (187) to the conclusion that the Strong Vocational Interest Blank for Women was not very useful at the educational level of the high school. The stated vocational choices of about twenty-five per cent of the group were in office work; the highest scores on the test were most often in stenography, office work, homemaking, and nursing. The girls were taking pre-college, or commercial, or home economics courses. It was con-

cluded that the Strong blank does not discriminate adequately between the occupations of stenography, office work, homemaking, and nursing, and that, among high-school girls, the test has less guidance value than the pupils' stated occupational choices.

In a brief article by Di Michael (55), it is argued that expressions of interest as given in common questionnaires are not reliable indications of vocational choice. It is suggested that vocational choice should be based on measured abilities and job try-outs. The practical nature of this suggestion for some occupations is evident; its uselessness in relation to choices among professions is equally clear.

Lentz and Nickel (122) argue that by contrasting the questionnaire responses of those who like and those who dislike an occupation one may obtain descriptions of personality characteristics of those interested in the occupation. Such a procedure, of course, resembles the procedure upon which the scoring system for Strong's inventories is based. The argument, then, implies by analogy that the vocational interest blank is a measure of vocationally significant personality traits.

Shellow (180) asserts that the Strong Vocational Interest Blank is a valuable aid to interviewing, primarily because it aids in establishing rapport, suggests significant traits of personality, and leads to discussion of important motivational factors which might otherwise be neglected. Shellow constructed a scale contrasting the interest-test responses of thirty selected "good" executives versus thirty clerks and stenographers rated as lacking executive ability. It appeared that the executives were more socially inclined, and more self-confident. The executives had less liking for routine work such as bookkeeping and more liking for work such as that of a building contractor, which involves supervisory responsibility. The scale showed large differences between the scores for the two groups, but it is possible that an interest scale so constructed, based upon such small groups, would not stand the test of application to new groups.

In considering the attitudes of college women toward women's vocations, Stevens (191) found differences in attitude in relation to parental occupation and place of residence. For example, girls whose fathers were in agricultural occupations had more respect for occupations such as athletic director, and less respect for jobs in department stores, than did the group as a whole. Daughters of teachers and secretaries had more interest in and respect for teaching and secretarial work than did the group as a whole. Preferences for occupations were indicated by ratings as to social significance, financial rewards, and prestige. A correlation of .42 was found between occupations preferred and occupations the individuals felt that they would probably enter. The daughters of teachers and secretaries, in becoming teachers and secretaries, were apparently following their desires rather closely, while other girls indicated that they would probably enter these occupations much more often than they would prefer to do so. Findings like these tend to clarify the meaning of entrance into an occupation, and to indicate some limitations of entrance into an occupation as a criterion of choice or preference.

Super's study (218) also aids in the clarification of concepts. According to Super, men who think they chose their occupations for economic reasons gain satisfaction from hobbies more than from their work, whereas men who think they were motivated by interests show the opposite trend. The study was based upon a questionnaire applied to 273 employees with well-developed hobbies. Hobbies were regarded as indications of interests which would have been shown in occupational choices if opportunity had permitted.

Williamson and Darley (246) secured statements of vocational choice from thousands of high-school seniors, and classified the choices as to occupational level, using the Brussell modification¹ of the Barr-Taussig scale. The choices were studied in relation to intelligence and scholarship ratings. Very few high-school seniors chose occupations in the semiskilled and unskilled labor classes, but a great many made no statement of choice. The average intelligence and scholarship ratings were highest for those choosing professional and executive occupations, and definitely lower for each successive step down toward the lower occupational levels. Those making no choice were in general intelligence inferior to those choosing professional and business occupations, but not inferior to those choosing clerical, technical, and supervisory jobs. There was much overlapping of the distributions of intelligence for the several socio-economic groups of occupations, and a great deal of evidence of discrepancies between ambitions and abilities.

In summary, one may say that there are very few careful studies which furnish clear-cut evidence of the validity of interest inventories for the prediction of vocational choice, but that this is due in part to the complexity of the problem. There are a variety of reports indicating that the majority of practical workers have confidence in the tests. The available heterogeneous array of evidence tends to show that the inventories are sufficiently valid for use, but the nature of vocational choice is such that no single quantitative test of validity is at present feasible. Strong's study, cited above, furnishes rather convincing evidence for the validity of his test, especially when one considers the extensive array of supporting evidence. Among the various reports, those which seem from internal evidence to be most competently done tend strongly to support the general inference of validity of the leading interest inventories. A common criticism is that the inventories are most effective for guidance of pupils choosing the professions, and as yet hardly suitable for the larger group of pupils with interests in the lower occupational groups. An obvious answer to the criticism is that the greatest need for guidance is in connection with occupations which require long and expensive courses of training.

¹This modification of the Barr-Taussig scale is presented in an unpublished Master's thesis on file in the University of Minnesota library, entitled "A Revision of the Barr-Taussig Scale of Occupational Intelligence," by E. S. Brussell.

The Prediction of Vocational Success

No one has discovered any remarkably effective technique of predicting vocational success. The best-known comprehensive study is that by Thorndike, Lorge, and others (226). In this study, over 2,000 children were tested in 1922 when they were about fourteen years of age. The tests included measures of intelligence, mechanical ability, and clerical ability. In addition, records were made of school achievement. Educational histories and vocational records were kept for about ten years. Very low correlations were the rule, indicating that significant predictions of success by means of tests and educational records were not achieved. Success was defined in terms of earnings, in the absence of any better criterion. Some of the incidental findings are of interest; for example, wages were not closely correlated with abilities. Body size was correlated with earnings among clerical workers; and earnings were about as good in clerical work as in mechanical work, for persons of average or above-average intelligence. The findings do not encourage one to expect any test to yield very good predictions of vocational success, unless vocational success itself is to be measured by an adequate objective criterion.

A number of comments on this study have been made by various workers interested in the prediction of vocational success. Braddock (22) points out that the study was begun at a time when methods and tests were less satisfactory than they are now. Macrae (134) criticized the objective and statistical approach to guidance and prediction, urging the necessity of what might be called a more flexible clinical method. In another report (135) Macrae expressed an objection to the use of earnings and job-levels as criteria of success. Thorndike (225) noted that educational careers are predicted by means of tests more successfully than are vocational careers. In an answer to his critics, Thorndike (227) asserted that the inclusion of any additional tests available at present gives little promise of good predictions in mechanical work. He suggested that vocational advising cannot do much more than indicate choice between large divisions of work such as manual-factory, office-clerical, or selling, and that earnings, interest, and job-level constitute as good criteria of success as do any other available measures.

The study by Thorndike and others (226) has thus indicated that the prediction of vocational success is very complicated and difficult, and that no effective test program existed as a basis for such prediction. Considering the difficulty of finding a suitable criterion for success, this is not surprising. Since vocational success is itself so ambiguous, and since it is only imperfectly related to the primary purpose of interest-testing, we must use all available pertinent and more specific criteria for validating interest inventories. In particular, it appears that part of the interest in prediction of success is based upon the fair assumption that success is correlated with vocational satisfaction.

The prediction of vocational satisfaction may be approached in other ways, and somewhat more directly. Strong (210) has shown that the voca-

tional interest test affords some prediction of entrance into an occupation and persistence in that occupation. Sarbin and Anderson (172) have shown that adults who are dissatisfied in their occupations tend to have interest patterns not in harmony with their occupations. Their study was based upon examination of one hundred adults, using the Strong Vocational Interest Blank for Men.

In a study by Stenquist (190), interests as indicated by stated preferences for trades were shown to be inadequate bases for curricular choices of students in vocational schools. Multiple correlations as high as .88 were found between trade-school success and tests of intelligence, clerical ability, and mechanical aptitude. Success in the schools was judged by ratings and records of work done. Thus one may infer that the prediction of vocational ability may be more successful than the prediction of vocational success. A survey made in 1929 showed that 74 per cent of the graduates of the trade schools, were working at the trades for which they were trained. As Stenquist indicated, aptitude for a given specific job can be predicted better than success in general. This is especially likely to be true if the latter is judged by cash earnings.

In a study by Hartzell and Murphy (92) it was shown that the Cleeton interest inventory is useful in predicting success in a training program for cosmetologists. Serious students of cosmetology secured high scores on the personal-service section of the inventory. Using this same inventory, Congdon (42) found correlations of about .40 between scores on the inventory and ratings of women students for success in student teaching. She concluded that measured interest is as valuable as intelligence for predicting success in student teaching.

Strong's study (207) indicates that scores on his scale for Life Insurance Salesmen are very useful in predicting success in selling life insurance. It was shown that, although men with low scores on this scale enter the field of life insurance, they are not successful and they do not persist in the occupation. Further, the great majority of those with high scores on the scale are highly successful, and the percentage meeting a certain severe criterion declines from 85 per cent for those with A ratings to 25 per cent for those with C ratings. This seems to be clear-cut evidence that in this field interests are important factors in success as judged by sales volume. It is perhaps significant that in the prediction of vocational success the studies which have emphasized tests of abilities and of aptitudes to the neglect of motivational factors have been relatively ineffective. We are probably justified in assuming that, if properly handled, the interest test and similar tests offer hope for improved prediction, and merit additional use in research.

The Prediction of Educational Choices

One of the most frequent uses of the interest test is in the classification of students on the basis of curricular preferences. Such curricular choices as are made have obvious significance for later occupational

adjustment. Moreover, since going to school is the main occupation of many persons for many years, the prediction of educational choice is significant in its own right. It will be seen that the prediction of educational choices and the prediction of educational success are two rather different aspects of the same general problem. Educational choices are more effectively predicted, and are perhaps more significant.

Some time ago, Van Tuyl and Eurich (240) showed that students with different major subjects were characterized by different interest patterns. Groups of juniors and seniors in the fields of social science, English, natural science, foreign languages, mathematics, and education, totaling 245 students, were matched on the basis of intelligence and reading ability. Marked differences in patterns of interest were found when the science and mathematics groups were compared with the social-science and language groups. Further analysis indicated that the natural-science groups had interests of a more highly specific character, while the interests of social-science groups overlapped more with those of various other major subject groups. Low correlations with scholarship were found.

In another study, Walters and Eurich (245) applied the Minnesota Interest Blank to 426 college women. Scoring schemes were constructed which furnished satisfactory discrimination between those with major interests in science and mathematics, in social science, and in English. These scales were almost completely independent of intelligence. The interests measured by these scales remained remarkably constant during college.

Anderson (5) reports a study in which three vocational interest tests were administered to men who were taking courses in accounting, and who were known to have an interest in accounting and related subjects. The Strong blank revealed these interests most effectively, and hence according to the criterion set up the Strong test was found to be valid. The Brainard inventory was somewhat less effective, and the Hepner blank was least satisfactory.

Duffy and Crissy (59) administered the Allport-Vernon Study of Values and the Strong Vocational Interest Blank for Women to 108 freshmen entering Sarah Lawrence College. They found a positive correlation between the score for "theoretical" values of the Allport-Vernon scale and the tendency to study and to excel in biology and physical sciences. A negative correlation appeared between theoretical values scores and the tendency to study and to excel in foreign languages. Aesthetic values scores tended to be high among students in foreign languages, art, and literature, while science students tended to have low scores for aesthetic values.

The Strong Vocational Interest Blank for Men was administered to 615 upper-class engineering students by Estes and Horn (69), who constructed reliable scales for the measurement of interests of subgroups in civil, mechanical, electrical, chemical, and industrial engineering. Each of the scales was effective in differentiating the group in question

from the other groups studied. From this research it seems possible to predict choice among these specific curricular offerings more effectively than seemed likely from results of earlier studies.

Garretson (81) constructed his preference questionnaire of 328 items for the purpose of differentiating between groups of ninth-grade boys interested in technical, commercial, and academic training. He succeeded in constructing highly reliable scoring keys for the measurement of such interests. Biserial correlations found between preference scores and enrollment in these different curricular fields were .87 for technical, .73 for commercial, and .56 for academic interests. The correlations with measures of ability in the areas of training chosen were small.

According to results obtained by Garrison (82), with 320 students at North Carolina State College, the Garrison interest inventory clearly discriminated between groups interested in engineering, agriculture, and business. This, like the study of Van Tuyl and Eurich, indicated effective prediction of choice between large and rather different areas in the curriculum.

Using the Allport-Vernon Study of Values with students of mental testing, Pintner (160) found that intelligence was negatively correlated with economic interests and positively with social interests. The students rated as best prospective school psychologists had high scores for social values and low scores for political and economic values. It was suggested that a high score in social interests may be a desirable quality for those who wish to become mental-testers. Theoretical interests were correlated positively with liberal attitudes toward religion, war, and racial groups. Political and economic interests were associated with conservatism. Such findings help to describe the nature and significance of interests by indicating their correlates.

The Minnesota Interest Test for Girls was administered by Tyler (234) to high-school girls taking college preparatory, commercial, and general courses. Three hundred fifty-three girls in the twelfth grade were included in these groups. A high negative correlation was found between college-preparatory interests and commercial interests. College-preparatory interests were correlated significantly with certain emotional reaction patterns, and with general intelligence.

In a study by Traxler and McCall (231), the Kuder Preference Record was administered to 637 college students in eleven curricular groups. Each such group had a characteristic profile of scores; these profiles were not similar for students in different subject-fields, except in cases where the two fields were closely related, as medicine and pharmacy. The scores for interests in science, computation, music, art, literature, social service, and persuasive activities were in general as one might expect. For example, high scores for scientific preferences were obtained by students of engineering, medicine, and pharmacy, but low scores were obtained by students of law, journalism, education, art, commerce, and secretarial work. Scores for interests in art were very high for art students, and not very high for any other group. Literary

interest scores were high among students of journalism, and very low among engineers, and students of art, pharmacy, and commerce. Many of the differences were obviously statistically reliable, although the statistical computations were not made.

Recently, Yum (260) employed the Kuder Preference Record in a study of the reactions of students in biological, physical, and social sciences. Yum did not find significant differences between the students in physical and biological sciences, but did find that these differed significantly from groups in the social sciences. The biological and physical science groups received higher scores for interests in scientific activities as defined by the test, while those in social science had higher scores for interests in literary activities.

Most of the studies of interests in relation to educational preferences have dealt with the first half of a twofold problem. They have shown marked differences in the interests of persons who have made particular educational choices. They have shown that such interests are stable and significant. They have not usually concerned themselves with the actual prediction of choices on the part of young people who have not yet undertaken a program of training. They have, however, definitely indicated that such prediction is possible.

The Prediction of Educational Success

The possibility of using the interest inventory for prediction of educational success or scholarship, was demonstrated by Jacobsen (102) in 1928. Her study showed that the interest inventory added a substantial amount to the prediction afforded by tests of intelligence, raising the correlation from .55 to .65. Since that time, many studies have been devoted to various aspects of the general problem.

Using Miner's interest blank, Dimmick (57) compared general psychology students who earned A and B grades with those earning grades of D or E. Further studies were conducted using groups of college freshmen chosen at random. Significant differences were found. It was shown that an interest inventory can be used to predict success in particular courses in college. A slight contribution to prediction independent of that made by intelligence was furnished by the interest blank.

Duffy and Crissy (59) used both the Allport-Vernon Study of Values and the Strong Vocational Interest Blank for Women in a study of 108 freshmen at Sarah Lawrence College. Academic standing at the end of the freshman year was not highly correlated with values scores or intelligence scores, although multiple correlations involving several values scores and intelligence scores were of the order of .34 and .38. Students with higher grades tended to have relatively low economic and political values scores; those with lower grades had relatively low theoretical and aesthetic values scores; social and religious values were relatively independent of grades. As one might expect, students of biology and of physical science had higher theoretical values scores, unusually successful students having markedly higher theoretical values scores. The opposite was true of students in foreign languages.

Using the Strong Vocational Interest Blank at New York University, Alteneder (3) found negligible correlations of interest scores with first-semester grades. However, special scales were not constructed. The pattern of results was interesting, suggesting that among men low scholarship was associated with engineering interests, and high scholarship with teaching interests and the interests of C.P.A.'s as measured by the Strong blank. Among women, superior scholarship was associated with the interests of librarians, teachers, lawyers, and social workers, and low scholarship with the interests of saleswomen and of stenographers. Comparison with other studies indicates that these are not chance findings.

Dunlap (63) constructed an academic preference blank of 214 items and applied it to groups of seventh- and eighth-grade students. Subscores on achievement tests showed correlations ranging from .30 to .60 with scores on the preference blank; total achievement correlated to the extent of .81 and .85 with preference scores. Expressed preferences thus furnished a substantial basis for the prediction of academic success; but little was added to the prediction furnished by intelligence tests. In another study, Dunlap (64) found that constancy of responses to items in his preference blank was positively correlated with achievement and with intelligence. Correlations ranged from .12 to .41.

Carlyle Jacobsen (101) has used the Strong Vocational Interest Blank for Men with some success in the prediction of medical aptitude. A somewhat complicated rating method was employed, using the Strong blank in addition to medical-aptitude tests. It was found that students with wide technical interests plus some other major interest pattern made outstanding records on the medical-aptitude test. Students with technical interests confined to medicine, and students lacking technical interests, although variable, showed a strong tendency to secure low ranks on medical-aptitude tests. Performance in first-year subjects in medical school supported these indications that versatility implies better achievement in medicine, and that technical interest in medicine is a hopeful indication, especially if accompanied by other major-interest patterns.

Using data from a freshman class at Wesleyan University, Langille (113) found that students tend to get their best college grades in subjects which they liked in secondary schools, and that best grades were somewhat rare among subjects disliked. Even the expectation of liking a subject not yet taken was of some value in predicting success in it, although likes reported on the basis of experience offered a better basis for prognosis. Somewhat different results were obtained by Nemoitin (144), who computed correlations between average ability in high-school subjects and ability in subjects liked best and those disliked most, finding positive correlations of the order of .50 to .60, and not reliably different for subjects liked best and those disliked most.

Walters and Eurich (245) showed that a scale for measurement of interests in science and mathematics was correlated with achievement in related fields of study. Scales for measurement of interests in social studies and English were not reliably correlated with achievement in those fields.

Reed's finding (163) that the Thurstone Vocational Interest Schedule is of little value in predicting scholastic success among college students could be variously interpreted. The test is too brief, it includes only occupational items, and it was not designed for prediction of scholarship.

Rothney (170) revised the Allport-Vernon Study of Values for use with high-school students. Using the revised blank, and holding constant intelligence and age, he found no significant correlations of scores with achievement in school subjects. The results followed a pattern, however, when applied to 306 high-school juniors. Religious values correlated $-.19$ with algebra grades; theoretical values correlated $.24$ with geometry grades. Part of the lack of correlation was evidently due to the very low reliability of the revised values test. All correlations between theoretical values and achievement were positive; all between political values and achievement were negative. These findings were supported by data from the control group as well as from the criterion group.

Garretson (81) found that scores on his preference questionnaire showed high correlations with choice among technical, commercial, and academic curricula. However, the correlations with achievement as measured by objective tests ranged from $.19$ to $-.30$. The correlation of technical interests with technical course grades was $.29$; of academic interests with academic grades, $.15$; of commercial interests with commercial course grades, $.03$.

Williamson (248) conducted a study to find out whether the choice of an occupation was significantly related to scholastic success. The study indicated that those college students who had not decided on choice of a career did not have significantly lower scholarship records in college than those who had decided. The explanation offered is that many who have made a choice have made an unwise choice—which does not contribute to improved general adjustment.

Using the Kuder Preference Record with 193 students at the University of Chicago, Yum (260) found significant relationships between interest patterns and grades. Literary preferences were significantly correlated with grades, for all groups; scores for interests in computational work were significantly correlated with grades, among women. Most of the correlations with grades were low, the highest being $.34$. The marks were averages of marks for all courses taken.

In a second study, Rothney (171) found positive correlations ranging from $.49$ to $.58$ between scores on an interest test and achievement of tenth-grade boys as measured by marks independent of intelligence and chronological age. But when the inventory was applied to a new group (other than the one upon which it was standardized), the correlations were reduced to a range from $.08$ to $.21$.

In 1937 Young and Estabrooks (259) presented their scale for the measurement of studiousness, for use with the Strong Vocational Interest Blank for Men. The scale was for the measurement of personality and attitude factors independent of intelligence and predictive of scholarship. They found correlations with scholastic standing of the order of

.35 for the studiousness scale, as compared with .45 for intelligence measures. The two together yielded a correlation of .56. The authors suggested that in schools where intellectual factors furnish the main basis for grading, the scale adds little to the prediction. They also suggested that the scale is not superior to high-school scholarship records for prediction of grades in college.

Williamson (249) found the Young-Estabrooks Studiousness Scale of doubtful value in the prediction of scholastic success. It did make a small unique contribution in addition to that prediction afforded by college-aptitude tests, but added nothing to the prediction furnished by high-school scholarship records. However, the latter are, in many areas, extremely inconvenient to work with, and often not available to research workers. In a further study, Williamson (250) applied the Young-Estabrooks scale to 539 freshmen at the University of Minnesota, finding a correlation of only .20 with first-quarter honor-point ratios.

Mosier (141) also investigated the Young-Estabrooks Studiousness Scale, finding it of some value when applied to liberal-arts students, but less effective in the prediction of grades of students in technical schools or in business administration. Grades based upon a year's work correlated to the extent of .47 with studiousness scores of Bachelor of Arts students, .325 with studiousness scores of Bachelor of Science students, and .29 with studiousness scores of engineering students, and only .05 with studiousness scores of students in business administration.

Segel and Brintle (177) showed correlations ranging from .49 for Engineering interests with mathematics scores to $-.43$ for the interests of purchasing agents with scores in English literature. The Strong Vocational Interest Blank and the Iowa High School Content Examinations were used in a study of one hundred junior college boys. Engineering interests correlated $-.47$ with grades in history; other correlations between interests and grades ranged from $-.22$ to $+.27$. In a further study of the same data, Segel (176) obtained correlations varying from .40 to .80 when interest-test scores were correlated with differences between grades in various subjects. Multiple correlations were still higher, but the smallness of the groups makes the multiple-correlation technique of doubtful significance. As one might expect on the basis of a formula for the correlation of sums, taking account of the negative values of some of the correlations one may improve the predictions over what they would be if only single achievement scores were correlated with single scores on given scales of the vocational interest blanks. In this study, intelligence was not held constant.

In general, the evidence seems to show that school achievement as measured by marks or by standardized test scores may be predicted, although somewhat inefficiently, by interest inventory scores. The correlations are usually low, but are sometimes moderately high, especially when the measures correlated are highly reliable. The correlations are not independent of intelligence or other possible predictive factors, but an independent contribution to the prediction can be made over and above

that furnished by intelligence tests. Where an independent prediction is not achieved, it usually appears that the standardization of the inventory was based upon criterion groups which were too small; in such instances, very good prediction of grades is achieved with the criterion group, and very poor prediction with control groups. The prediction of scholarship with intelligence held constant is very poor; this is largely due to the great dependence of scholarship upon intelligence. In schools where grades are based upon many factors other than ability and achievement, such grades may be predicted by means of specially constructed interest scales. Interest inventories are not as efficient as high-school records for predicting college grades, but in some situations the latter are much less convenient to obtain and much more difficult to interpret, differing from school to school. The existence of clear-cut patterned relationships indicates that differences in achievement in various subject fields can be predicted by means of interest tests. In this type of work, Segel and his co-workers (176, 177) have obtained multiple correlations ranging from .40 to .80. Although correlations of .40 and .50 are not surprising in this sort of work, the higher values are to be regarded with some suspicion, especially where the multiple correlations are based upon data from small groups.

Chapter VI

SPECIAL PROBLEMS OF TECHNIQUE

Several problems in the technical aspects of the theory and practice of interest measurement have received continued attention. Some of these problems maintain their popularity apparently because they are admirably suited to the planning and execution of studies of very limited scope; that is, the problems can be approached in piecemeal fashion by individuals with very limited resources. Some of the other problems continue to be studied because they are fundamental and can hardly be neglected. Whatever the causes involved, one cannot say at the present time which studies have been most useful or which have contributed most to progress in interest measurement.

Economy in Scoring Tests

One of the recurring types of investigation is that concerned with economy in the scoring of the interest inventory. Studies such as that by Bedell (16) in which self-estimated interests are compared with measured interests may be interpreted as relating to this problem, since the scoring problem follows after the decision as to the method of approach. It happens that the methods of interest measurement at present regarded as most effective are the ones involving laborious and expensive scoring procedures.

In an early study, Strong (195) described the standard procedure for scoring his interest blank. It makes use of a formula devised by T. L. Kelley for the evaluation of item-responses. This formula is evaluated in the light of two criteria: one is the degree of separation between different occupational groups obtained by the method; the other is the validity of the resulting scores in the light of follow-up studies. Use of the formula resulted originally in item-weights ranging from plus thirty to minus thirty. Most of the labor in scoring consists in the adding of such weights. As Strong stated, all of the variations of the method tried out in the early studies had lowered the test's validity.

One of the early attempts to reduce the work was the study of short-cuts in scoring by Strong and Green (198). They tried the effects of scoring the blank with reference only to the "likes," ignoring the "indifferences," and "dislikes," etc. It was found that ignoring any one of the columns of responses reduced the discriminative power of the test, although rather high correlations with the standard scoring results were obtained. The effect of this was to reduce the discrimination between occupational groups. Reduction of the scoring weights from a 61-point range to a 10-point range did not reduce the efficiency of the blank in discriminating between occupational groups. The latter short-cut was recommended as leading to practical economies in scoring, not by the hand method primarily but in the method involving use of Hollerith machines.

Later Kelley (105) furnished a revised formula for securing item-weights. In the meantime, the standard range of item-weights had been reduced in practice to the range from plus fifteen to minus fifteen. In a study by Strong and Carter (211) the new formula furnished by Kelley was shown to be slightly superior to the older formula, in the light of extensive data. The new formula has since been adopted. The study also indicated that the range of item-scoring weights could be reduced to the range from plus four to minus four without serious loss. Further reduction of the range of weights, however, was accompanied by significant losses in prediction.

In a series of studies, Dunlap and others (89, 108, 156, 157) have explored unit-scoring methods for the Strong Vocational Interest Blanks, in which all weights for item-responses were reduced from the standard nine-point range to a three-point range. These studies have been more successful than most of the attempts at simplification of the scoring procedures, as is shown by correlations above .90 between the scores obtained by the unit-scoring method and the standard method. The studies have been careful and extensive, involving large groups of subjects, employing fourteen scales of the interest blanks, and including application of the new scales to groups other than the ones upon which the scales were developed. In Kogan and Gehlmann's study (108), for example, correlations between scores obtained for the same occupations by the two methods ranged from .96 to .99 for fourteen scales, and had a median value of .98. When scores were expressed in terms of letter grades, only two scores out of 2,912 shifted by more than one full letter-grade step. Similar results were reported by Harper and Dunlap (89) using the women's blank. These writers conclude that the simplified scoring, which saves about fifty per cent in time and effort, results in no appreciable loss of efficiency.

These studies appear to have achieved a practical simplification of the scoring. The disagreement of results of these studies and those by Strong and his collaborators is probably to be explained by the fact that different criteria have been used. Whereas Dunlap and others have furnished only a close approximation of the standard scoring procedure, Strong and his co-workers used the more severe criterion of separation between criterion groups. Even when the correlations are extremely high, there is still room for increase in the overlap between criterion groups. The attempts at simplification of the scoring do not, of course, result in improvement of the instrument, but rather in provision of something which appears to be almost as good and more convenient. The real need is for improvement.

Factor Analysis

More far-reaching modifications of the scoring methods for interest inventories are implied, but not adequately evaluated, in the contributions furnished by factor analysis. This field of work tends to harmonize with

the theory of functional classification of occupations. It is not necessary to regard the use of occupational group scales or scales for the measurement of group factors as opposed in any way to the use of specific occupational scales; instead, it appears that the group scales may supplement the more specific scales (or vice versa). The significance of group-scales in counseling and in exploratory work on interests of young people is dependent upon two conditions. The first is the great expense of detailed scoring of interest inventories. The second is the fact that indication of a general area of work is often more appropriate than an attempt to find a specific occupational niche.

Using the intercorrelations furnished by Strong's studies of Stanford seniors, Thurstone (228) published a factor analysis of the interests measured by eighteen occupational scales. His study indicated that the measurement achieved by the eighteen scales can be explained in terms of four main factors. These factors, by inspection, seem to imply interest in science, language, people, and business, respectively. Carter, Pyles, and Bretnall (32) applied the same methods to the study of interests of high-school boys as measured by the same test, using twenty-four occupational scales. It appeared that the interest scores of high-school boys could be explained in terms of the same four factors. The organization of interests of high-school boys appeared markedly similar to that of older men, as indicated by great similarity of the intercorrelations between scales. No marked correlations were found between interest scores and chronological age. In a study by Dyer (86), using the same test and employing nineteen scales, factor analysis appeared to lead to the same four factors. It was further shown that the four occupational scales giving the best estimation of the four factors were those for physicist, journalist, minister, and life insurance salesman. In order, these scales may be interpreted as measuring interests in science, language, people, and business. They furnish of course only approximations to such interest factors.

Frames of Reference

The preceding discussion of factor analysis of vocational interests obviously implies the possibility of development and use of new frames of reference in interest measurement. One is naturally led therefore to a consideration of some of the complexities of the frames of reference now in use. The criterion groups employed in the development of the scales determine in part what is measured by the existing scales. A fact often overlooked is that the use of a group of men-in-general, with which the criterion groups are contrasted, also determines in part the nature of the measurement.

As an illustration, if the group of men-in-general is selected as representative of the population at large, then all of the occupational scales for professions will have a major factor in common. One may speculate that it would be something like Strong's occupational level

scale. It would be so easy to find differences between special professional groups and such groups of men-in-general that the commonest sort of attitude differences would tend to dominate the measurement. The criterion groups would, in other words, be much more like each other than like men-in-general so defined. The resulting scales would discriminate very poorly between men in the various criterion groups.

In order to secure the best discrimination between criterion groups of men in various occupations, it is necessary to choose very carefully the group of men-in-general. In dealing with criterion groups of men in the professions, it is probably most effective to use as the contrast group all the men in all the criterion groups except the one under consideration in the construction of the specific scale.

Some published results illustrative of these principles may be seen in the work of Estes and Horn (69) in which the Strong blank was applied to 615 engineering students. The authors found that differentiation between engineering curricular groups was effectively accomplished when they constructed five scoring keys enabling prediction of interests in civil, mechanical, electrical, chemical, and industrial engineering. The successful discrimination between such groups may be contrasted with Strong's finding that several keys for measuring the interests of engineering-student groups were in such marked agreement as to indicate the interchangeable character of the scales. This situation is analogous with that found in the study of interests of women's groups, in which it appears very important to consider different arrangements of the women-in-general group in the attempt to discriminate among women's groups of professions. Such considerations are probably fundamental in explaining why Strong's women's interest blank will probably discriminate among women's occupational groups more effectively than Manson's blank. In the other case, it seems that if one contrasts engineers with men-in-general, as Strong did, almost identical scales will be developed for the interests of various groups of engineers. But if one contrasts engineers in one curricular group with engineers in other curricular groups, as did Estes and Horn, discrimination among engineering groups is secured. This significance of the change in frame of reference is very important, and it is furthermore significantly related to the matter of policy in deciding upon the degree of detail to seek in the diagnosis of fields of interests.

Arrangement of Items

Suggestions concerning the effects of arrangement upon the effectiveness of an interest blank are given in a study by Greene and Dahlem (88). These writers prepared two forms of the Michigan Vocational Preference List, arranging the items according to occupational divisions in one form, and leaving them in the customary alphabetical order in the other form. Retest reliability was .89 for the grouped-item form, and .76 for the ungrouped-item form. The correlation between the two forms was .83. It

may be suggested that the grouped-item method confronts the examinee with a relatively more completely-structured stimulus-field, and may control his responses in a manner such as to make them both more consistent from time to time, and more superficial.

Speculations concerning the effect of arrangement of the items upon measurement arise when one looks over several of the measuring devices. In particular, a question may be raised concerning the desirability of having all the items arranged in choice-triads as in the Kuder Preference Record. To the present writer it seems that this arrangement over-emphasizes the choice element. That some persons have more interests than others without having any of the interests less intense because of the existence of the others is a reasonable hypothesis in the light of any available data. A test, such as Strong's, in which a variety of subtests makes use of several types of item-arrangement may be superior.

Miscellaneous Considerations

At the present time there is little basis for any final choice among methods of using and interpreting results from interest inventories in practical guidance work. The trend, however, which is clearly marked, suggests that group interest scales may be used as a preliminary to specific occupational scales, especially in the initial phases of diagnosis and counseling. A survey of available studies indicates that it is easier to diagnose broad fields of interest than to point out specific occupational implications. As is suggested by the work of Paterson and Darley (152), many occupations may be regarded as differing in name more than in type of activity. The result is that workers in certain families of occupations may have similar interests.

In 1934 Strong (205) described the grouping of occupations often used in interpreting the results of the vocational interest blank. Five main groups were indicated. In so far as interests are concerned, changes from one of these groups to another are very unusual; hence it seems likely that use of these broad groupings would be very effective in high-school and college counseling work. This sort of functional occupational classification is based upon the reasonable theory that, although various indications of interest may change considerably between ages fifteen and thirty, interest patterns of a broad sort remain fairly constant.

One may state, as a hypothesis, that possible techniques for the measurement of interests have not been fully exploited. It may be suggested that interests are many-sided, and that only a few facets have been carefully examined. In a study by Super and Roper (220), for example, a procedure for measuring interests by means of memory for items in an occupational motion picture was described. In study of the occupation of nursing, it was shown that scores obtained by this method were independent of ratings obtained from the Strong Vocational Interest Blank, and yet the scores did differentiate nurses from non-nurses. If the Strong blank may be regarded as valid for use with nurses, the total data indi-

cate the possibility that several valid and independent indications may be obtained by varied procedures within one occupational classification.

Since techniques are often developed after theories and concepts, it may be appropriate to mention here the reasons given by Terman (224) for the vocational successes of gifted persons. Terman found the gifted children much superior to the average in economic success and in occupational classification. But achievement and intelligence are apparently not at all perfectly correlated. Terman's data led to the conclusion that the most important factors affecting success of these gifted persons were drive to achieve, superior personality adjustment, stable and happy emotional nature, and freedom from frustration.

The emphasis upon the drive factor reminds one of the study by Wren (255) in which it appeared that vocational aspiration levels of adults are somewhat independent of such variables as age, marital status, stability of employment, and length of period of special education. The level of vocational aspiration is most closely associated with dominance, family occupational background, ability, income, and amount of education. These variables are such as to suggest the stability and the general importance of the composite of interests and drives subsumed under the rubric of vocational-aspiration level.



INDIVIDUAL DIFFERENCES IN INTERESTS

The psychology of individual differences in interests is as yet relatively undeveloped. In recent years there have been a few investigations of age and sex differences in interests, and of hereditary and environmental correlates of interests. Also, there have been a few experimental investigations, such as those on the development of attitudes, which relate directly or indirectly to the origins of interests. But as might be expected in a very young field of investigation, the majority of workers are pre-occupied with the unsolved measurement problems. And there is a tendency to talk about such topics as the interests of high-school pupils as if individual differences were negligible.

Age Differences

The most extensive study of effects of age upon interests is that in which Strong (197) administered his vocational interest blank to 2,340 men in a variety of occupational groups. The results of this study have already been discussed in the section on permanence of vocational interests. Here we need only note that age differences appear to be less in magnitude than occupational group differences. Age changes in interests were in general gradual, decreasing with increase in years. The study, of course, was cross-sectional, involving the inference of change with age through comparison of different samplings in the several age groups.

Studies by the retest method were made by Burnham (25), Van Dusen (239), and Strong (203), using college students and college graduates as subjects. These studies were concerned primarily with the reliability and permanence of vocational interests. They may be compared with studies of high-school groups conducted by workers at the University of California Institute of Child Welfare. Carter and Jones (33) showed that the interests of high-school boys are highly differentiated, variously patterned, and apparently quite meaningful in the light of other data concerning their lives and personal traits. Carter (34) has shown that patterns of interests, as revealed by profiles of standard scores, remain fairly stable throughout the high-school years. Similar results were found by Taylor and Carter (222) working with high-school girls. Extended statistical studies by Canning (29), and by Taylor (223) have shown that the interest scores of high-school boys and girls are reliable, and that the changes as shown by retest coefficients are not great. This series of investigations shows that the interests of high-school boys and girls are almost, but not quite, as reliable and stable as the interests of college men and older adults.

The effects of age upon the development of interests are as yet only incompletely understood. There are numerous implications current in the literature, suggesting rapid development during early life, and suggesting the instability of interests, or the lack of interests, among

elementary and high-school pupils. Studies such as those by Carter (30), however, fail to show any high correlations of interest scores with age among junior and senior high-school samplings. Although the interests of college men and older adults, especially successful adults, are apparently more highly developed than the interests of high-school boys, it appears unlikely that the differences may all be attributed to age. There are important selective factors which render college populations and successful older men's groups incomparable with random groups of high-school students.

Sex Differences

Sex differences in scores on the Strong Vocational Interest Blank for Men were studied by Carter and Strong (31), who administered the test to a hundred boys and a hundred girls in secondary school groups. Girls were found to have more interests in occupations involving language and contacts with people; the scores of boys were lower on most of the scales except those in the science groups. Results indicated that the interests of girls are more mature than those of boys of the same age and grade. Finch and Odoroff (71) conducted a similar study with the same blank and obtained results in agreement with those of Carter and Strong. Finding the same pattern of sex differences in the interests of junior high school groups as among senior high school groups, the authors were led to the conclusion that the patterns of interests found are well developed prior to age fourteen.

Some of the findings in the foregoing investigations are supported by a rather different type of study, by Rallison (162), who found from questionnaires administered to 1,659 boys and 1,855 girls that the boys concentrate their interests in science, while the interests of girls are spread throughout a host of other fields. Rallison also concluded that children acquire most of their interests in science prior to the age of twelve or thirteen years.

Investigations of sex differences in interests have been hampered often by the form and limitations of available measuring instruments. Carter and Strong (31) and several others have used the same interest blank for both sexes, in order to secure responses to the same items. This procedure may be criticized because the interest blanks have been especially adapted for use with a particular sex; however, more recent studies by Seder (174, 175) have furnished some justification. Seder (174) found that various women's groups secured very similar ratings from the men's blank and from the women's blank, for occupations for which both blanks were scored. She also found, by factor analysis, that scales similarly named on the two interest blanks have similar factor loadings, with the exception of the lawyer scales. Seder's second report (175) furnished additional indications that the interests of men and women engaged in the same occupation tend to be similar. These investigations indicate that the Strong Men's Blank may be used to supplement the Women's Blank in the study of vocational interests of girls.

Crissy and Daniel (47) reported results of a factor analysis of the interests of women, using the Strong blank. The organization of vocational interests of women as indicated by such analysis is in many respects different from that of men. Interest in science is apparently the least-important factor in women's interests, and interest in "male-association" the most important. Interests in people and in language were intermediate. The factors, of course, were named by inspection of the factor loadings. A comparison with the work of Thurstone (228) and others (32) suggests that women are much more interested in social activities than are men. But careful reading of Strong's discussion (215, page 244) shows that it is hardly safe to summarize these indications by stating that women are more interested in people than are men.

Yum (260) applied the Kuder Preference Record to 111 men and 82 women students at the University of Chicago. The men's scores were significantly higher for the science and persuasive interest categories, and reliably lower for the artistic and social service categories. Even among students in biological sciences, the men had reliably higher science scores, while the girls had significantly higher artistic-interest scores. Among students of social science, men were significantly higher in persuasive interests, women in artistic and social-service interests. Literary preferences were markedly correlated with grades for both groups, while computational scores were correlated with grades among women only.

Crosby and Winsor (48) tested 222 students in colleges of home economics and agriculture, using the Kuder inventory. The students were asked to estimate their interests in the various categories. Women's estimates were reliably more accurate than men's in the social-service category, but no other reliable sex differences were found.

In a study by Traxler and McCall (231) using the Kuder Preference Record, boys were found to have higher scores on the scientific, computational, and persuasive categories, while the scores of girls were higher for musical, artistic, literary, and social-service categories.

The old idea that the interests of girls are more realistic than those of boys continues to find support in recent studies. Dunlap (64) found more evidence of constancy of academic preferences among girls, although there were some differences in relation to particular parts of the curriculum. Girls' attitudes toward arithmetic were more constant, while boys' attitudes toward geography and history were more constant. Coxe (43) presented evidence that the percentage of girls interested in certain occupations agreed more closely with the percentages of people actually in such occupations than did the percentages of boys. The study by Carter and Strong (31), cited above, indicated that the interests of high-school girls are more like those of older adults than are the interests of high-school boys.

Familial Resemblances

There have been very few attempts to study the dependence of vocational interests upon familial factors. Beckman (14) investigated family resemblances in occupations, in a study of application forms of 750 persons who passed requirements for employment in Cincinnati in 1928. A large percentage were following occupations regarded as superior in social and economic status to those followed by their fathers. This study is in contrast with that by Davidson (53), who found little evidence of vertical occupational mobility in a California community. Since occupational mobility is complicated by factors other than those of interests, it cannot be extensively discussed here. Studies of occupational similarities between parents and children do not, of course, provide crucial evidence as to the hereditary basis for preferences.

In an investigation of twin resemblances, Carter (30) found resemblance coefficients of approximately .50 for identical twins and of .28 for fraternal twins, using the various scales of the Strong Vocational Interest Blank. The coefficients of twin resemblance were definitely lower than those found in various psychological studies of abilities. The greater resemblance in interests of identical than of fraternal twins suggests that hereditary factors play a part in the development of interests, but the author noted that no crucial proof is afforded by the mere pattern of correlation coefficients, since the environments of identical twins are more similar than those of fraternal twins. The fact that the coefficients are lower than those expected in studies of intellectual resemblances can no longer be attributed to the supposition of low reliability of the measurements, since the more recent study by Taylor (223) has shown that the Strong scales are highly reliable when used with such high-school samplings. Recently, Strong (215) has reported a study showing that the resemblance of fathers and sons in interests is approximately the same as that of fraternal twins as shown in the above-mentioned investigation.

The possibility that hereditary factors have some influence in the development of interests is suggested by the fact that personality traits and occupational interests are related to such characteristics as physique and intelligence.

Environmental Influences

A number of studies by Remmers and others (11, 136, 166, 167) are pertinent to the question as to the relation of various specific environmental factors to vocational interests. In these studies, a scale for measuring attitude toward an occupation was employed. Remmers and Whisler (167) have shown that a vocational-guidance program can markedly change attitudes toward occupations. There is some reason to believe (136) that actual study of a problem tends to produce liberal attitudes toward it. In other words, negativism is not independent of

ignorance. The more specific studies are discussed more fully in the later section dealing with the control of vocational choices. We may note here, however, that they furnish proof that environmental influences can be arranged to produce desired effects upon vocational preferences.

The significance of these studies with respect to the development of vocational preferences is dependent of course upon the nature and organization of occupational attitudes. A number of studies support the contention that there is not and cannot be complete independence of attitudes toward social, vocational, educational, and personal affairs. Although vocational preferences are very complex, and often little understood by the individuals who possess the preferences it is evident from introspection and from the organization of the measuring instruments that the preferences are dependent upon attitudes toward persons, things, activities, money, business, etc. The writer interprets one's attitude toward an occupation as a complex resultant of the interplay of social attitudes and feelings of the value of activities and things. As such, a vocational preference is hardly, in its essence, to be regarded as highly unstable and transient. Knowing this complexity, one is inclined to expect a gradual change with age, and a many-sided development with respect to occupational interests. Also, one is inclined to expect a certain resistance of such interests to sudden change; there is an identification of one's self with one's occupation. Vocational interests are a manifestation of deeply ingrained traits of personality; they may be amorphous or clear-cut, but they are not usually evanescent. The degree to which interests develop and change with age, according to this interpretation, is dependent upon the achievement of sound personality integration as one's life progresses.

Other Correlates of Vocational Interests

Study of people's hobbies furnishes further insight into the nature of occupational interests. Super (217) investigated the interests of a large number of hobbyists, and found significant relationships between avocational and vocational interests. He found that it was possible to develop effective scoring keys for the Strong Vocational Interest Blank, to be used in the diagnosis of extra-vocational interests.

In a study of one hundred female students, Andrews (8) found very slight relationships between scores on the Iowa Silent Reading Test, and scores on the Strong scales for the interests of stenographers, nurses, office workers, and social workers. Although reading ability is highly correlated with intelligence, nevertheless the latter is a factor of some significance in the development of vocational attitudes. In 1932, Carter (30) showed that intelligence is positively correlated with scores on some of the scales of the Strong Vocational Interest Blank, and negatively correlated with scores on certain other scales. Further, Carter and Jones (33) found some evidence that in a given grade-group those with better-developed vocational interests were younger and more intelligent than those with vaguer notions about occupations.

Lewis and McGehee (124) conducted an extensive controlled study of the effects of intelligence upon interests of children, by contrasting the interests, as reported by teachers, of the highest and lowest ten per cent. It was found that superior children have many more interests than retarded children. The retarded children much more often had no hobby, but apparently had more interest in housework (for girls) and in working in stores or on farms (for boys). The dull children had slightly more interest in social activities, clubs, and sports. The brighter children were much more often interested in music, dramatics, reading, Scout work, religious activities, collecting, and shopwork.

THE PROBLEM OF VOCATIONAL CHOICE

Occupational choices and vocational interests are related, but are not identical even when perfectly measured, since people cannot state those preferences of which they are not aware, and they cannot always enter the occupations in which they are interested. It is apparent that choices can furnish only a very imperfect criterion of interests. At present it seems desirable to describe the interrelationships between these two categories of responses.

One of the first problems to be considered is that of indecision. Inability to make a choice is not a matter of chance; growth toward vocational choice is apparently integrated with other aspects of development, rather than an independent phenomenon. The tendency to have a vocational preference is associated with age, but of course not merely as a product of maturation, and certainly not entirely as a result of efforts in deliberate teaching.

A questionnaire study by Achilles (1) dealing with results from 4,527 college students indicated that only 12 per cent were completely undecided about a vocation. The data showed that the better students, as indicated by scholarship standing, had more definite ideas about vocational choice, and had thought more about the problems involved. Anderson's study (6) of 673 men students in college showed that about two-thirds had chosen a vocation, but only half stated the specific type of work they expected to follow. The students were apparently influenced little or not at all by the prevalence of occupations in the communities in which they lived, or by the occupations or suggestions of their parents. The data indicated a desire to change from the occupations and locations in which they grew up. A suggestion of impracticality of the choices arises from the evidence of desire for higher types of occupation than the ones which the majority will have to accept.

A survey of students in Berea College by Cardill (36) indicated that two-thirds of them had made their choices of occupation while in high school. Crapullo's study (45) of a small sampling of high-school students indicated that they were almost completely ignorant of the preparation necessary for various occupations chosen, and of the duties involved, and that the choices were apparently little influenced by the advice and guidance of friends or parents.

In a questionnaire survey of 4,543 boys in academic and technical high schools, Kroger and Louttit (110) found that about ninety per cent stated vocational preferences. As usual, a majority aimed at occupations higher than those of their fathers. Comparison with census data indicated that a majority wanted the higher jobs, in which few persons actually earn their livings, while few chose the laboring jobs in which many have to work eventually.

Wilson (252) studied the occupations of college graduates in relation to their earlier first and second choices as stated at college entrance.

Slightly under 60 per cent of both men and women entered the occupation of first choice, and slightly over 65 per cent entered that of either first or second choice. The great majority of men whose fathers had also graduated from the same university did not enter the same occupations as their fathers.

The above-mentioned studies are representative of many, and are in general agreement on several points. They show that the percentages who have made occupational choices vary with different samplings. The percentages are probably much influenced by procedure in securing the data. For example, if one asks students what occupations they will probably follow, the distribution of results will not be the same as if one had asked what occupations they most desired to follow, etc. The choices made by students are often impractical, in the sense that they show marked independence of aspects of external reality which might seem to be important factors in wise choices. In spite of the autistic nature of such choices, they are characterized by some stability and resistance to change.

Furthermore, such choices are distinctly related to later careers. Hartson's study (91) indicated marked agreement of choices of individuals made during senior year in high school and choices of the same persons made during the senior year in college, and both were in general agreement with later occupational records. Hawley (94) studied college training as preparation for later life, and found high percentages of agreement between fields of specialization and later vocations. Only 27 per cent of college graduates studied by Hawley entered fields unrelated to their undergraduate work, and only 15 per cent felt that their training was of little value to them.

The Prestige Hierarchy

Some of the real reasons governing occupational choices of young persons center around the prestige hierarchy of occupations. Studies by Anderson (7), Duncan and Duncan (62), Hartmann (90) and others are in general agreement as to the nature of this hierarchy. As indicated by Anderson (7), college students rank the professions highest, unskilled occupations at the bottom, and business and clerical jobs in the middle positions. Social prestige and economic returns were more closely related to each other than to social contributions, as indicated by rankings furnished by the students. The rankings were largely independent of father's occupation, student's choice of profession, and class standing in college. Similar rankings were obtained by Duncan and Duncan (62), along with reasons for such rankings. The college students considered medicine, law, business, and teaching as most desirable, with common labor as least desirable. The reasons given were usually vague, but the aggregate of data indicated a basis in consideration of personal fitness, financial reward, social prestige, and healthfulness of jobs.

Hartmann (90) studied the prestige of vocations by securing rankings

from 450 persons in various localities and jobs. The rank order of respect and admiration for jobs was very much the same in large and small communities, and in agricultural and industrial regions. The professions stood at the top and the labor jobs at the bottom. The physician was at the top in all groups, and members of a given occupation ranked their own occupation only slightly higher than it was ranked by others. Within the teaching profession the indicated order of merit placed the college professor at the top, with school superintendent, principal, high-school teacher, and elementary school teacher following in that order.

Lehman and Witty (117) reported upon the social status of occupations as seen through the eyes of elementary and high-school students. Physicians, bankers, and ministers were most respected, in that order. There were sex differences, of the sort one might expect; for example, aviators were more admired by boys, nurses and teachers by girls. The prestige assigned to vocations was significantly related to opportunities for following those vocations. In a later study (120) the same workers reported that the occupational choices of elementary school boys showed approximately zero correlation with the number of workers engaged in the (138 listed) occupations according to the census. A marked tendency was noted here, as in the other reports, for boys to wish to enter the crowded professions and to avoid the jobs which were most numerous but lacking in prestige and remuneration. This tendency, which is frequently deplored, is more correctly regarded as a natural response to social and economic pressures.

The Reasons Given for Occupational Choices

In the earlier days of interest measurement, the reasons given for choices of particular jobs were frequently tabulated. A few studies of this sort have been made in the last decade; recent workers tend to be much more sophisticated, but the most naive acceptance of descriptive facts, followed by overgeneralization, is still seen occasionally.

In a study by Austin (10) it was found that the commonest reason given for choice of teaching was influence of relative or teacher, and next in order were fondness for school subjects, liking for teaching, good salary, fondness for children, easy job, and long vacations. The frequency of superficial reasons was greatest at ages fifteen and sixteen, but only a minority at any age seemed to give sound reasons. This study, based upon data from 1,105 children aged eleven to nineteen years, indicated a prevalent lack of exact information about jobs.

Discrimination between various levels or aspects of thinking about choice of careers is indicated in a study by Gilger (84). In three New York technical schools 579 male and female students were asked to report the kind of work they felt best prepared to do, the kind they most wanted to do, and the kind they would like to do if there were no restrictions. Most of the students were preparing for the kind of work they felt best fitted for, while the type of work they most wanted to do was much

more concentrated among the professions, and the most autistic (third category) was even more related to the prestige hierarchy of professions. This study suggests some explanations of the findings of investigators who point out the autistic and impractical nature of vocational ambitions. One cannot help wondering about the heterogeneity of the data collected and the probable lack of control of something like these three categories of response, especially since some workers find the vocational ambitions of high-school students much more practical than other studies indicate. Technical school students are of course to be regarded as a specially selected sampling.

The reasons given by technical school students for their choices of occupations are shown by Valentine (235). The majority of these students, boys of ages ranging from fourteen to seventeen, indicated choices apparently based upon opportunity and convenience rather than upon evidence of individual suitability. A call might be made, and often is made in one form or another, for more psychological testing and other provision of experience which will give pupils a better indication of their abilities and their shortcomings. One might ask for a beginning in a more realistic system of school examining and promoting.

In another study, Valentine (236) reported upon the reasons given for the choice of the teaching profession, among university students. Anonymous reports were secured from about four hundred graduate students. These indicated that among men the most important factor in choice was "economic desirability." Women report liking for teaching and fondness for children as a stronger motive. Influence of parents and teachers was reported as of little importance. The objections to the profession as indicated by men were low salary, long and expensive training, and small prospects for promotion; as indicated by women, they were likelihood of getting into a rut, or of being dominated by examinations, and mental strain.

The motives for choice of career have been studied also by Vernon (242), who dealt with reports obtained from older women. The drives reported gave emphasis to social conformity, humanitarianism, independence, stimulating activity, ease and security, superiority, power, and social admiration as the things sought by women, and therefore, presumably, the main factors affecting the choice of careers among girls.

In a second study, Vernon (243) considered these various drives and indicated how different drives could motivate different individuals to produce the same choice of career, and also how the same drive could operate in different persons to produce very different career choices. These studies seem to point out a need for much more research, taking into account the whole personality and the total environmental situation involved in the matter of career choices.

The Correlates of Vocational Choices

Member (138) published an extensive report dealing with interrelationship of interests and vocational choices, based upon data from 19,000 school children of all grades. The number of vocations chosen (verbally) by boys was 70 in the elementary and high schools, and 37 in college; for girls, the numbers were 35, 39, and 40, respectively. The choices of boys become narrower with increasing education, but the reverse is true for girls. Girls appear to be more influenced than boys by the social status of the jobs named. The boys by no means exhaust the total available list of occupations, mentioning fewer than half those listed in well-known books about jobs. Only 26 occupations were named by more than one per cent, and engineering and aviation were the only vocations mentioned by over ten per cent. As in the usual study, engineering, medicine, and law were popular through all the educational levels. Girls likewise indicated a very restricted list of choices, with teaching and stenography the only two listed by more than ten per cent. Duller children listed more vocations than brighter ones (presumably with less meaning). There were slight differences between urban and rural groups, except for the incidence of interests in farming and nursing. As usually found, "too many" children chose the professions, and too few the "medlocre" occupations.

Pallister's study (149) of 478 girls and 447 boys who left school was concerned with their interests, ambitions, and abilities. The boys mentioned three times as many jobs as the girls, and the frequency of occupational choices did not agree with the available jobs in the area. For example, 58 per cent wished to enter the skilled manual trades, in which there were jobs for about 10 per cent. The educational requirements for the more popular occupations were not met by the individuals wanting such occupations.

Intelligence as a Factor in Vocational Choice

Clark and Gist (39) administered intelligence tests in 1922-23 in rural high schools in Kansas, and collected data in 1935 and 1936 concerning the occupations entered by the graduates. The study is one of the few recording the relationship between intelligence and occupations actually entered. Records for 2,423 persons were complete. The ten categories into which the occupations were classified showed marked differences in the means and standard deviations of high-school IQ scores. The results agree in general with previous studies which have reported upon children's IQ's in relation to the occupations of their parents.

Byrns (28) collected data from over 75,000 boy and girl seniors in Wisconsin high schools, in order to study the relation of vocational choice to mental ability and occupational opportunity. The data from 42,479 girls showed that about 14 per cent were undecided, and that the choices of the remainder covered about thirty-nine occupations.

Of these, the occupations varied markedly in relation to the mental ability of pupils choosing them, with writer and author being chosen by the brightest girls, and beauty culture being chosen by the dullest girls. The study of 34,472 boys showed 24 per cent undecided, and the others listing a total of fifty-seven occupations. Again, the brightest chose writing as an occupation, while the dullest chose dairying or cheesemaking, undoubtedly because of local influence. In the case of the girls especially, there were pronounced discrepancies between the numbers choosing given occupations and the numbers capable of being absorbed in those occupations as indicated by the 1930 census data for Wisconsin.

In a study by Crosby and Winsor (48), 222 college students estimated their interests and were tested by the Kuder Preference Record. A correlation of .42 was found between intelligence-test scores and the capacity to estimate one's interests as measured by the test. The average correlation was .54 between the strength of interests as estimated for the various categories and as measured by the test.

Occupational choices in relation to intelligence were studied by Live-say (125), whose report is based upon data from high-school seniors in Hawaii. The usual relationship between mean intelligence and socio-economic level of occupations chosen was noted, but it was further pointed out that the range of intelligence for those seeking each occupation was so great that many could certainly not qualify for the vocations selected.

In a study of vocational aspirations Lurie (129) secured statements of vocational choice, statements as to vocations the individuals were attempting to enter, and statements as to occupations about which information was desired. Application of the Barr scale (11) indicated a correlation of .56 between the intelligence requirements of preferred occupations and of occupations about which information was desired. The Barr ratings for occupations of choice correlated .21 with similar ratings for occupations the individuals were trying to enter at the time.

In a study by O'Brien (147) the fallibility of job-success criteria as indicators of the suitability of vocational choices is indicated. The necessity of taking account of not only abilities, but also dislikes and likes, social traits, attitudes, and habits, is reiterated in the discussion.

The problem of improving the relationship between vocational choices and the general fitness of the individuals concerned is in part a social and psychological one, too deep-seated to be easily remedied through any simple educational program. For example, occupational opportunities for certain minority groups are known to be limited. Preferences are complexly affected by such conditions. Fitchett's study (72) of 325 Negro college students in South Carolina by means of questionnaire methods indicated that the Negro restricts his efforts toward only a few occupations, with special emphasis upon those which are least profitable from an economic standpoint, such as teaching. It is recommended that guidance with an aim toward expansion of the variety of vocational aims would be desirable. Such a program, of course, could easily fail to be realistic.

Large and Blau (128) studied the intelligence levels of various broad occupational categories, using the Barr scale for estimating the intellectual requirements of occupations, and Fryer's scale of occupational intelligence standards. The authors found a correlation of .76 between these two scales, for a list of forty-four occupations common to both the Barr and Fryer lists. The results from both scales were of course related to broad occupational groupings; that is, the professional and upper business occupations require high intelligence, and the labor jobs require less intelligence. The data suggest that the bungling manner in which young persons have to select their jobs does lead to some degree of selective placement in accord with their fitness. The lack of precise adjustment of the intelligence of individuals to the intellectual requirements of their occupations may of course be a cause of frustration and dissatisfaction in many instances.

Personality and Vocational Choice

In a study by Nelson and Nelson (143) it was shown that the choice of vocations such as banking, dentistry, music, and government service is associated with conservative attitudes, while the choice of journalism, social work, law, and farming is associated with liberal attitudes. Students making no choices apparently have poorly developed social attitudes. Attitudes favorable toward religion are found among students of the ministry, home-making, medicine, music, and teaching. Hence it is seen that the choice of occupation is correlated with social, religious, and other moral attitudes. One might argue from such data that the choice of occupation is in itself indicative of certain somewhat stable aspects of personality and ought therefore to have some correlation with other measures of personality manifestation, such as those obtained from interest inventories. Since each measure used is itself a fallible indication of personality traits significant for occupational satisfaction, it is to be expected that the correlation would be low, and so, in fact, it is.

Choice of occupation is discussed by Williamson (248) in relation to scholastic motivation. Records from large numbers of freshmen were examined to discover whether the choice of occupation leads to improved scholarship. No evidence was found to support the idea that improved scholarship results from having settled the troublesome question of vocational choice. Williamson points out that having made the choice does not relieve those who have not made appropriate choices. One might also add that among those who had made inappropriate choices and among those who had not made choices there probably did exist a great many compensatory habits and attitudes which might have prevented the inferred maladjustment or lack of integration from exercising a noticeable effect upon their behavior. Also, the maladjustment may have been in the curriculum. Making a vocational choice would not insure better scholarship if appropriate courses were not available.

Preferences in Relation to Opportunities

The vocational choices of college students were studied by Sisson (184) in a manner which parallels that employed in several studies of high-school students. About 54 per cent of the students entering Wesleyan University planned to enter law, teaching, or medicine, but the percentage fell to 35 after one year in college, and to 28 after three years. Study of earlier classes showed that only about 17 per cent had actually entered these professions. About 34 per cent actually entered business, while only 11 per cent of the undergraduates intended to do so. In a further study by Sisson (185) of 279 students at Wesleyan, aptitude scores were compared with vocational choices and fathers' occupational levels; it was found that students entering college aim at vocations beyond their abilities.

The studies by Sisson are accompanied by a discussion and interpretation which seems to furnish sound advice. One might say that the process of occupational adjustment of college students involves a trend toward lowering aims in order to make them consistent with abilities and opportunities. The years in college are apparently not idly spent; but one may deplore the fact that prevalent optimism, ignorance, and lack of realism require that these years be spent in lowering of aspiration levels in order to adjust to reality. The need in secondary education today is perhaps for a more consistent and tough-minded seeking for the truth, rather than for the unrealistic and evasively optimistic attitudes which seem to be the rule.

Williamson and Darley (247) have reported upon trends in the occupational choices of high-school seniors. In a very large sampling, it was shown that the percentage having made no choice was between twenty and forty. Among the choices made, the emphasis was upon the higher professional and executive occupations for the boys, and the lower professional, business, technical, and commercial occupations for girls. Trends over a four-year period seemed to indicate a decrease in choice of the professions for men, particularly engineering, and an increase in agriculture, forestry, and skilled trades. Here it should be remembered that the study was published in 1935, and was based upon data collected in the years immediately preceding 1935. These were not ordinary years, hence the results may have been affected by the pessimistic influences prevalent in the business depression. The comparative results on sex differences appear to support the view that the choices of girls are more realistic than those of boys. Perhaps such findings occur because girls are less aggressive than boys, and more inclined toward social conformity.

First, second, and third choices of occupations were obtained by Nick (146) from 1,038 boys in the eleventh and twelfth grades. These choices were studied in relation to job possibilities in the state and in the nation. Then a program of instruction was carried on in order to provide factual information about sixty-three trades. A second administration of the questionnaire later indicated greater realism in the choices made.

In an extensive study of 1,011 college students, Sparling (188) showed that a very large majority intended to enter professions, and expected to earn three or four times as much money as knowledge of those professions would indicate as realistic. A very small proportion of the students' fathers were in the occupational levels sought.

Miscellaneous Aspects of Vocational Choice

The use of tests for the prediction of vocational fitness is criticized by Moffatt (139), who feels that only an extensive tryout on the job can indicate fitness. One cannot perhaps quarrel with the idea that the tryout is often the ultimate criterion, but the general viewpoint expressed by Moffatt seems to ignore the fact that jobs actually entered are limited and often obviously inappropriate, and that the tryout method is completely inadequate in so far as choice among professions is concerned.

The influence of home and school in the choice of a vocation was studied by Pinney (159) through questionnaires obtained from 916 students in high schools in Chicago and in sections of Wisconsin. Responses to the questions asked indicate that only a very small percentage of the children from rural high schools had any information about the occupations which they chose to follow. Some evidence of similarity of occupation of father and choice of child was found.

According to a study by Peters (154), the most important factors influencing vocational choices of high-school seniors are parents, other relatives, and friends, as indicated by reports of the students. Peters concluded that the family is the major agency affecting vocational choices. The fact that this result is not supported by other studies is perhaps due to the use of self-reports as the criterion.

The vocational choices of students were compared with the occupations of their fathers, in a study by Nelson (142), in which data were secured from 3,211 students in eighteen colleges and universities. A fourth of the students stated no choice of vocation; this fact was found to be related to specific occupational background, but not occupational level. The tendency to avoid the parent's occupation was emphasized among those whose fathers were farmers and laborers, but a tendency to follow the father's occupation was seen among the children of physicians, teachers, and journalists. The correlation of children's vocational choice with occupation of father is small, but the relationships are complexly patterned and significant.

Somewhat different light upon the nature and significance of occupational choices, and even entrance into an occupation, is furnished by Reinhardt (164) in a study of over six hundred freshmen in a teachers' college. Many of the students expected to make teaching a mere stepping-stone to other occupations, among which were included agriculture and engineering. Comparison of results from two different years separated by a five-year interval indicated a decrease in the length of time the students wished to teach. The study suggests that one need not consider

occupational choices, or training for an occupation, or even entrance into that occupation, as an ultimate or perfect criterion of interests or ambitions. Sometimes it is only indicative of ability to adjust to necessities. Among the investigations of validity of interest tests, Strong's studies (204, 207, 210) have made most realistic use of such facts.

Interpretation of Studies of Vocational Choices

In summary of the foregoing reports, it may be said that there have been repeated and many-sided studies supporting the conclusion that undue optimism characterizes the vocational ambitions of young persons, and that the processes of educational and vocational adjustment in early adult life include, as no small component, a series of adjustments to reality which require lowering of aspiration levels and undoubtedly involve disillusionment, discouragement, and emotional maladjustment. The reports justify the general conclusion that more efforts should be made in early life to build up among school pupils more realistic habits and fuller realizations of their abilities and limitations. One might also say that influence might be exerted in states and in the nation to introduce into the secondary school curriculum more courses and materials relating to the serious effort of earning a living and attaining a function in community and nation.

Such a program of education should be adjusted to the facts of individual differences. It seems that the studies which emphasize the impractical nature of vocational preferences frequently ignore individual differences to a degree which is totally unjustified. One might ask who is aiming at the wrong job-level. It is important to discover and utilize exceptional talent, and to encourage the most competent young persons to aim at the higher occupations. Such a program has implications which justify all our efforts toward improvement of the efficiency of guidance techniques, including tests and measurements of all types.

The studies of prestige of occupations yield rank-orders which agree markedly with common knowledge, but the precise findings contain implications not always appreciated by pupils, teachers, or guidance workers. The prevalent agreement among widespread groups as to the prestige hierarchy is evidence in support of the belief that the so-called impracticality of youthful ambitions is not to be blamed upon the young but is a condition perfectly natural as the result of cultural forces in our nation. Perhaps one should go further and suggest that some sort of national influence of a deliberate sort (with appropriate rewards) should be exercised in order to lead young persons toward the choice of occupations which are of national importance but at present undesirable because of lack of financial reward, unsanitary working conditions, and a host of other undesirable characteristics. To exert such an influence would be much more desirable than to reiterate the well-worn facts about the impractical desires of youth. Naturally, youth wishes to climb and to better itself in our competitive society. Seldom is there apprecia-

tion, from the beginning, of the systematic nature and tremendous extent of the obstacles to success.

The Control of Vocational Preferences

There is an evident relationship between the factors correlated with vocational choices and the nature of controls which might be exercised over such choices. Having ended the previous discussion with recommendations arising from the more descriptive studies, we may turn now to a consideration of research aimed at influencing vocational attitudes.

a) The provision of information.—One very reasonable method of influencing vocational choices is the furnishing of information and facts of all kinds. Such service may take many forms, one of which is shown in the report by Anderson (4), who studied the job placement of 891 college women. These college women entered twenty-eight different vocations, chosen apparently according to tradition. Beginning salaries were usually under \$1,300 per year; very few earned as much as \$2,000 per year. One finding was that women with business-school training in addition to college education earned on the average about a hundred dollars a year more than those without the business training. Starting salaries were highest for teachers, social workers, and secretaries, in that order, and lowest for clerical workers and saleswomen. After five years of experience, salaries averaged about \$150 a year more. In occupational choice these women showed very little initiative, apparently merely avoiding manufacturing and personal service jobs. This sort of material is directly relevant to the integration and development of attitudes toward vocations. Such attitudes are often developed on the basis of false or inadequate information.

The attitudes of young persons toward various jobs would of course be much influenced by the provision of more definite information as to the manner in which success is judged in the various occupations. The invalidity of the customary criteria of occupational success is discussed by Stott (192). Each of the common criteria, including production records or output, number of posts held, length of tenure, reasons for leaving jobs, and employers' reports, has its own troubles. Satisfaction in the work is also ambiguous, for it is as often dependent upon foreman or firm or policy as upon type of work or level of compensation. The basis for discussion of the criteria consisted in follow-up studies lasting from one to six years after guidance, and dealing with groups of 1,200 and 1,310 individuals, with careful controls as well as experimental groups.

b) General personnel service.—Service aimed at improvement of occupational choices furnishes the basis for a book published for the benefit of Yale University students by Crawford and Clement (46). This book concerns itself with self-analysis, classification of interests, and analysis of occupational activities into types of functions, such as activities dealing with ideas, people, things, or business. Much space is devoted to discussion of earnings in various professions and businesses,

and to the treatment of relevant facts about seventy-four different occupations. The authors place emphasis upon aptitudes and interests and the satisfactions to be derived from particular vocations.

A book by Earle (68) treats similar problems from the standpoint of parents and general readers, including discussion of abilities, aptitudes, and training required, and the use of psychological tests in preoccupational guidance.

Newberg's book (145) concerns itself with the principles and methods of vocational choice. It is written as a text for college courses in vocations, and discusses such topics as educational aims, vocational motivation, information about jobs, and the uses of measurements of physique, mentality, and personality.

In his studies of vocational choices of college students, Sisson (184) makes some recommendations which might help in formulating objectives for appropriate guidance courses. According to these recommendations, schools should provide students with information about the crowding of professions, services to aid in diagnosis of pupils' abilities and aptitudes, and training to enrich their lives through hobbies and cultural pursuits which can be carried on no matter what the occupation.

c) Job analysis.—The philosophy underlying job analysis was discussed by Baumgarten (13), who concluded that the first step in job analysis is division of the job into its essential activities; the second step is relating these activities with physiological and psychological capacities. The third step is consideration of emotional factors which find expression in the job, and the fourth is consideration of the social environment of the occupation. The third and fourth steps listed may be regarded as most directly related to vocational-interest measurement, but it appears likely that these are not independent of physiological and psychological capacities, as any survey of the literature on the psychology of personality will indicate.

A functional classification of occupations is discussed by Charters (38), who was interested in the use of such a classification for instructional purposes and for service to the students at Rochester Mechanics Institute. The Minnesota Occupational Rating Scales and Counseling Profile, prepared by Paterson and others (153), make practical use of the theory of functional classification of jobs. The rating scales indicate the minimum levels of abilities required in each of 430 occupations, while the profile indicates the relative standing of the student on each of six abilities classified as academic, mechanical, social, clerical, musical, and artistic. This appears to be a sounder type of classification of work activities than can be provided through direct use of the more or less meaningless census classification. It provides a quantitative and objective tool for use by counselors.

Beckman (15) has provided a scale for gauging occupational rank on the basis of the intelligence, skills, education, and training required in various occupations. This sort of effort is of obvious practical value, but the task undertaken is extensive and difficult.

Chant (37) applied the method of paired comparisons in order to determine the relative importance of twelve factors considered by supervisors as important in making a job interesting. Two scales were developed, showing high agreement between the attitudes of young men in department-store work and young men in various other jobs. In order of importance the factors were: opportunity for advancement; steady work; opportunity to use one's own ideas; opportunity to learn a job; good boss; high pay; opportunity to be of public service; good working companions; comfortable working conditions; good hours; clean work; and easy work. It is unlikely, of course, that the same order would be maintained for older employees, or for women.

d) Experimental approaches.—Bateman and Remmers (12) report upon the effects of studying book information about jobs. They show that reading of a book about careers brought about significant changes in the attitudes of students. Some evidence of sex differences was included.

Remmers and Whisler (187) studied attitudes toward common occupations both before and after periods of instruction, with a group of 140 high-school students. The vocational guidance program resulted in more realistic attitudes toward farming and homemaking, but did not affect other influences of the prestige hierarchy. The effects of instruction were highly specific. A study by Remmers (166) indicated that such changes in attitudes toward agricultural problems, brought about by fifteen minutes of instruction, were retained after an interval of one year.

In a study by Kitson (106), work experiences in various fields were provided by the project method. These projects covered fields which were liked and those which were disliked. It appeared that the experience usually resulted in the development of interest in the work, even in fields previously disliked. The author seemed to feel that instead of measuring interests, which he felt were usually absent, it would be better to develop interests. It should be remembered here that occupational satisfaction is a complex involving other factors than mere liking for the work processes. Some of the other factors have already been listed in connection with Chant's study (37).

Nick (146) showed that a guidance program consisting of conferences and the provision of information about trades changed the occupational choices of high-school junior and senior boys in the direction of greater realism. A similar outcome was found in the work of Bunting (23), who discussed the effects of counseling upon pupils' choices. The choices of tenth-grade students were frequently unrealistic, since too many aimed at the professions. Group discussions and individual reading were provided as aspects of the counseling program. As a result, more of the students planned for business careers and the frequencies of preferences were shown to be closer to the distribution of available jobs.

At the present time, it appears likely that much can be accomplished in the way of influencing vocational choices of young persons. The research literature furnishes a rich variety of techniques and concepts,

and provides a basis for optimism by showing that the mere provision of factual information leads to solution of some of the problems of vocational orientation. It appears that in this field of education the most effective program will be one based upon detailed knowledge and a policy of stressing the positive aspects of guidance, with particular emphasis upon discovery of the truth about jobs and self.

Chapter IX

SUMMARY

A survey has been made of the major psychological studies of the last ten years dealing with problems of vocational orientation. Consideration of the various contributions leads to the following general conclusions:

1. Vocational interests are being interpreted and studied as aspects of personality, having implications for vocational success and satisfaction. Interests, so conceived, are not independent of other measures of emotional, social, and intellectual maturity.

2. A developmental viewpoint is necessary for full understanding of vocational interests. Vocational interests are capable of extensive and complicated development, based in part upon native aptitudes, and affected by educational forces both direct and indirect.

3. The need for objective devices for the measurement of interests is widely appreciated. Numerous interest inventories have been developed. In most research studies, preference is shown for three or four of the inventories which have been best standardized.

4. The measurement of vocational interests by means of modern inventory techniques is about as reliable as the measurement of intelligence by means of group tests.

5. The vocational interests of high-school students are incompletely developed, but they are highly individual, definitely patterned, and much more reliable and permanent than earlier studies would indicate. The changes which take place as time goes on are orderly and to some extent predictable.

6. Interest tests are more valid than they are generally considered to be. The best interest inventories are useful in the prediction both of educational choice and of vocational choice and satisfaction. They are much less useful in predicting educational success (scholarship) or vocational success. The validation of interest tests is hampered mainly by the inadequacy of any available criteria of success. In predicting vocational success, interest inventories are sometimes effective within a given occupation. No objective definition of success seems to stand the strain of comparison of persons in various different occupations.

7. There are several special problems in the measurement of vocational interests which continue to receive much attention. The idea of a functional classification of occupations according to interests has led to much productive work. The technique of scoring of interest tests complicates the analysis and simplification of the variables measured. At present, there is a marked trend toward preliminary classification of interests according to broad families of occupations.

8. The development of the modern interest inventory has permitted much significant research upon individual differences. Age differences are associated with changes in the organization of interests. Sex differences in interests are much as one might expect to find them in view of

traditional and conventional social pressures. Studies of heredity and environment as factors in the development of interests have led to new appreciation of the significance of both. It appears that study of individual differences in interests, making use of the seriatim-test technique, will lead to important discoveries which remain concealed so long as research is confined to study of group differences by cross-sectional methods.

9. Vocational interests, as measured by modern inventory techniques, are significant in the general problem of vocational choice. Studies of vocational choice, using less technical procedures, are difficult to evaluate from a scientific standpoint, but they provide a background necessary for the evaluation of interest tests and essential to the realistic direction of research. Vocational choices are much influenced by the prestige hierarchy of occupations. Vocational choices are loosely correlated with measures of intelligence, family background, amount of education, and general opportunity. All these factors are basic for an understanding of the individual's vocational choice. The full significance of vocational choice in individual development, however, cannot be satisfactorily gauged without some knowledge also of the individual's vocational interests. It is here that the modern, objective, and properly validated interest inventory can make its most important contribution.

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